California Forest Pest Conditions 2011

A publication of the California Forest Pest Council

CALIFORNIA FOREST PEST CONDITIONS 2011

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Cover Photos

Top: Sulphur fungus (*Laetiporus sulphureus*). Photo Credit: Kim Camilli

Bottom: Severe branch flagging on red fir due to dwarf mistletoe and Cytospora canker, Grizzly Meadows, Trinity Alps Wilderness, Shasta-Trinity NF. Photo Credit: Brent Oblinger

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THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council, a 501(c)(3) non-profit organization, was founded in 1951 as the California Forest Pest Control Action Council. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, biologists, and others interested in the protection of forests from injury caused by biotic and abiotic agents. The Council's objective is to establish, maintain, and improve communication among individuals who are concerned with these issues. This objective is accomplished by five actions:

1. Coordinate the detection, reporting and compilation of pest injury, primarily forest insects, diseases and animal damage.
2. Evaluate pest conditions, primarily those of forest insects, diseases and animal damage.
3. Make recommendations on pest control to forest management, protection agencies and forest landowners.
4. Review policy, legal and research aspects of forest pest management, and submit recommendations thereon to appropriate authorities.
5. Foster educational work on forest pests and forest health.

The California Board of Forestry and Fire Protection recognizes the Council as an advisory body in forest health protection, maintenance, and enhancement issues. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report was prepared by Forest Health Protection, USDA Forest Service, Pacific Southwest Region in cooperation with other member organizations of the Council, published by the California Department of Forestry and Fire Protection and distributed by the two agencies.

The report is available in color at the following website:
http://www.fs.fed.us/r5/spf/publications/pestconditions/index.shtml

California Forest Pest Conditions 2011

Introduction

By Tom Smith

The 2011 edition of the California Forest Pest Conditions Report covers forest health and pest issues impacting California's forests and woodlands throughout the 2011 year. It is meant to be a documentation of the state's forest health and forest pest conditions for forest resource managers, pest management specialists, landowners, and other interested parties both within and outside of California. This document is a publication of the California Forest Pest Council and its various associated members.

This year's Pest Conditions Report continues a tradition of documents begun in 1949 with the first California Forest Insect Report. Forest diseases, abiotic conditions, animal damage and invasive plants were added over the years, along with reports on monitoring and aerial surveys for the state. New in 2011 is an historic forest pest condition highlight on Douglas-fir beetle. Also new in 2011 is information related to firewood movement and the associated threats of invasive pest introductions to California, and potential transportation throughout the state. The importance of firewood movement is also reflected in the addition of a new Firewood Task Force under the California Forest Pest Council in 2011.

A review of the past California Forest Pest Conditions Reports has shown several trends. A number of native insects and diseases have undergone outbreak wave years, typically related to weather conditions. For example, bark beetle outbreaks are often related to extended periods of drought, whereas foliar pathogen outbreaks are often tied to years of high and late precipitation. The early reports did not list pests exotic to California until forest diseases were included and white pine blister rust was the only non-native pest reported in the state. The number of non-native pests continued to increase to the point where about one third of the major pests listed in recent reports are exotic to California. New exotic pests are added nearly every year.

Information in this document was gathered from numerous sources. The primary source for forest health issues on federally managed land in California comes from Forest Health Protection, Pacific Southwest Region of the United States Forest Service. Most information concerning issues on state and private lands was provided by the California Department of Forestry and Fire Protection, Forest Pest Management Unit. Other sources of information include the California Department of Food and Agriculture and the University of California.

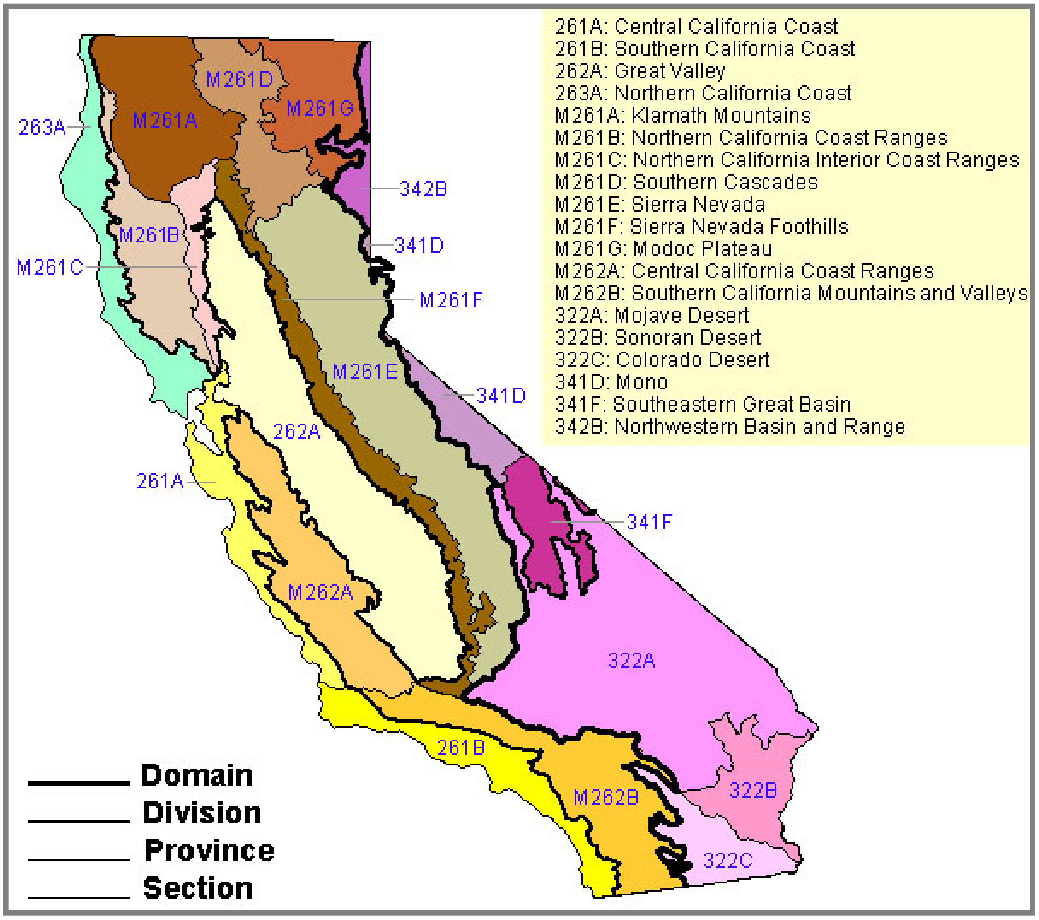
Fig 1: Mountain pine beetle-caused mortality in whitebark pine along Highway 168, east of North Lake, Inyo NF.

Photo: B. Bulaon

Without the input from personnel in these organizations as well as numerous other organizations and individuals, this report would not be possible.

The report is organized into several sections. Chapters cover forest insects, forest diseases, abiotic issues, animal damage, invasive plants, and surveys and monitoring. Incidents of pests and pest damage are referenced to counties or according to Ecological Units of California as defined in Ecoregions and Subregions of the United States (Map 1, Bailey, et al., 1994). The report is also available online at: http://www.fs.fed.us/r5/spf/publications/pestconditions/index.shtml

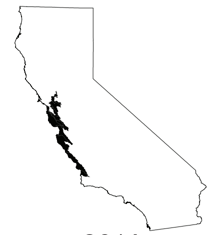
Map 1: Ecoregions of California, Bailey



Historic California Forest Pest Conditions Highlight: Douglas-fir Beetle

Dendroctonus pseudotsugae Hopkins
By Amanda Grady and Danny Cluck

The following information was consolidated from Forest Health Protection biological evaluations dating back to the 1950s and California Forest Pest Conditions Reports from 1960 to the present.

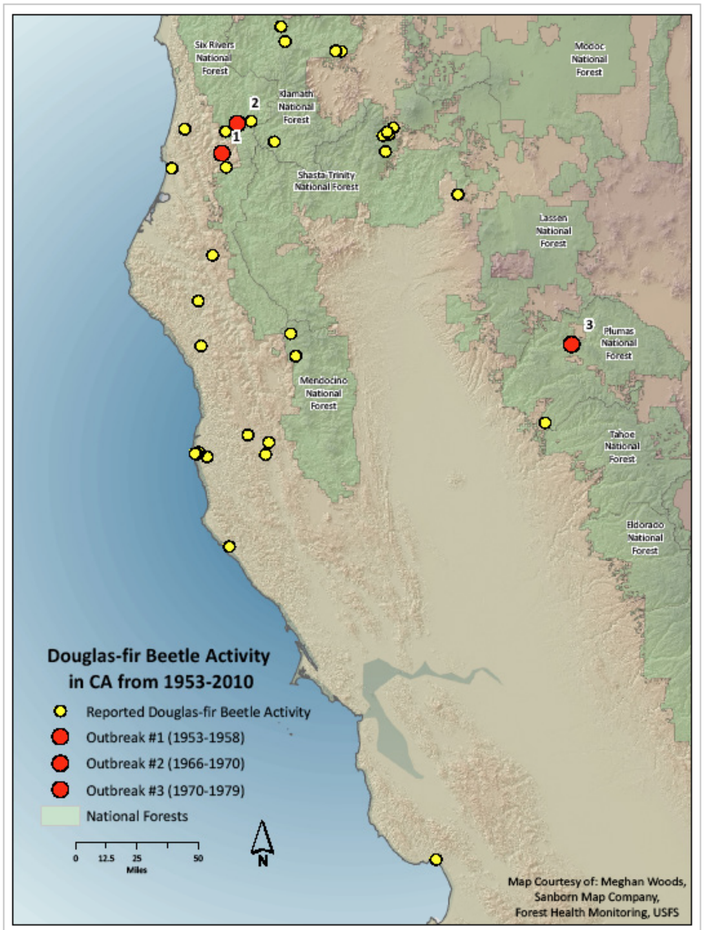

261A


263A


M261A

The Douglas-fir beetle is the primary bark beetle of Douglas-fir throughout its North American range (Furniss and Carolin 1977; Wood 1982). Douglas-fir beetle normally breeds in felled, injured, windthrown, or defoliated trees, or trees weakened by high stand density, disease, fire, and drought. Most often these resources are limited spatially and temporally within the forest until a disturbance event such as a winter storm or fire increases the availability of suitable host material and leads to substantial increases in beetle populations. At epidemic population levels, beetles may kill apparently healthy trees over large areas. Outbreaks in standing trees typically last 3 - 4 years (Dodds 2004), but may be prolonged with extended drought (Schmitz and Gibson 1996).

In California, the Douglas-fir beetle distribution follows the range of Douglas-fir: central to northern Sierra Nevada, southern Cascade Mountains, and Coast Ranges. Most beetle-caused tree mortality has been reported in the northwest portion of the state (Santa Cruz, San Mateo, Sonoma, Lake, Mendocino, Humboldt, Del Norte, Siskiyou, Trinity and Shasta counties; 261A, 263A, M261A, M261B, M261D), where Douglas-fir makes up a larger percentage of stands and diseases generally play a more significant role in tree health. However, Douglas-fir beetle mortality has also been documented as far south as Monterey Bay and in the northeastern portions of the Sierra Nevada where Douglas-fir is often limited to north and east facing slopes (Map 2).



Map 2: Documented endemic (yellow points) and epidemic (red) Douglas-fir beetle activity in California.

Map: M. Woods

Douglas-fir beetle in California appears to be somewhat unique from interior western states in its general lack of activity in high density or recently burned stands. The three major outbreaks recorded in California have been associated with wind, flood, or winter storm damage rather than fire injury or stand density. These outbreaks also differed in their duration from other western states in that they persisted from 4 - 8 years (California Forest Pest Conditions Report 1960-2010 and Evaluations 1950-2010) rather than 2 - 4 years. Although it has reached outbreak population levels


M261B


M261D

and caused significant economic losses, Douglas-fir beetle in California generally only attacks windthrown or diseased Douglas-fir at very low levels (Wood 1982; Wood et al. 2003).

M261A

North Coast Outbreak 1 (1953-1958)

The first recorded outbreak of Douglas-fir beetle in California began gaining momentum in the mountains of northeastern Humboldt Co. (M261A) on the Hoopa Valley Indian Reservation in 1953, which consisted of approximately 70,000 acres of primarily old-growth Douglas-fir. Entomologists responded to concerns from foresters on the reservation with ground surveys conducted in early June of that year. Western pine beetle, mountain pine beetle, and fir engraver were all found attacking and killing standing trees. The Douglas-fir beetle was found in two wind-thrown trees along road cuts and thus considered endemic or normal posing little risk to reservation timber. In 1954, air (the first attempt in California to map any large forest insect infestation from the air) and ground surveys were conducted on parts of the Six Rivers, Klamath, and Shasta-Trinity National Forests and on the Hoopa Valley Indian Reservation. This flight revealed that the Douglas-fir beetle infestation covered a much larger area than previously thought.

The majority of the activity (extensive group kills) occurred on the Orleans Ranger District, Six Rivers NF, on the southern part of the Happy Camp Ranger District, Klamath NF, and along the northeast edge of the Hoopa Valley Indian Reservation (M261A). From ground surveys, it appeared that no active Douglas-fir beetle infestations had occurred in recent times prior to the outbreak. Steep and difficult terrain limited ground surveys and the ability to calculate the entire area affected. However, ground surveys did report that 46% of the total insect-caused loss was associated with 1953 attacks while the remaining 54% was attributed to 1954 attacks. Only 1953 mortality could be estimated by aerial surveys (1954 foliage had not yet become discolored) which reported 1,052 group kills containing approximately 47.7 million board feet (MMBF). The additional 54% of beetle-caused loss from the 1954 activity was estimated at over 103 MMBF. In 1955, additional aerial and ground surveys were conducted to locate new areas of mortality. These surveys found 21.86 MMBF of dead timber in Grouse Creek and Madden Creek drainages. In 1956, the Douglas-fir beetle outbreak became less intense but persisted through 1958 with more concentrated infestations moving into the Grider Creek drainage in Siskiyou Co. and a slight increase noted on the Hoopa Valley Indian Reservation.

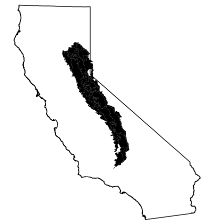
North Coast Outbreak 2 (1966-1970)

The second recorded Douglas-fir beetle outbreak in California occurred in the same general area (Humboldt, Siskiyou, and Trinity Counties; M261A) in 1966. The center of the infestation was located on the Hoopa Indian Reservation and the Orleans area, extending north up the Klamath River to Happy Camp, and southeast to South Fork Mountain near Hayfork. The catalyst for the 1966 outbreak was storms and associated floods in December 1964 and January 1965 which resulted in copious amounts of uprooted and windthrown Douglas-fir trees. Salvage efforts were hampered by a depressed lumber market and a lack of road access. As a result, much of the downed material remained on site. During the spring and summer of 1965, brood populations emerged to attack and kill thousands of standing trees. These trees began to fade in August and September of 1966.

The Douglas-fir beetle epidemic sharply decreased in 1967 after killing 249,000 mature trees containing a gross volume of 796 MMBF in 1966. A ground survey conducted in July of 1967 indicated a 95% reduction in trees killed compared to 1966 losses. The 1966 epidemic further subsided to endemic levels in 1968. Although the beetle population seemed to crash, there were probably still active spots and brood material available for a final extension of the outbreak in 1970. During that year, several million board feet of Douglas-fir became infested on Tish Tang Ridge of the Six Rivers NF (Humboldt Co., M261A). The successive years of outbreaks probably removed much of the available mature host material. Since the 1970 occurrence, no major outbreaks have occurred in the area and only a few scattered trees and a few small group kills have been reported. Most of these reports indicate an

association with heavy levels of dwarf mistletoe, Armillaria root disease, drought, and/or flatheaded woodborers.

Northeastern California Outbreak (1970-1979)



M261E

A large Douglas-fir beetle outbreak began on the Plumas NF near Butte Lake (Plumas Co., M261E) in 1970 (with earlier reports of scattered activity in each of the previous 3 years). The final catalyst for the outbreak was a series of winter storms in 1970 that provided windthrown trees for Douglas-fir beetle population increases in 1971. An estimated 1 MMBF of “over-mature” Douglas-fir timber was killed and evaluations indicated increasing trends for 1972. Salvage plans were prepared to remove infested material, but the projects were never completed. In 1973, the beetles continued to kill trees with more than 40 localized outbreaks containing approximately 3 MMBF of dead and dying Douglas-fir identified by aerial and ground surveys. The inability to move forward with prompt salvage facilitated the continuation of the outbreak, which persisted through 1974. In 1975 and 1976, Douglas-fir beetle activity seemed to decline on the Plumas NF, but the effects of an 18 month drought extended the outbreak another year. In 1979, outbreak activity ceased to be reported in Plumas Co.

Reported Fire and Douglas-fir Beetle Interactions in California

M261A

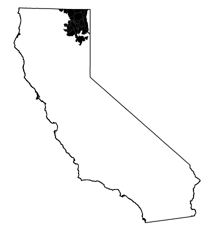
M261B

Although fire is a major catalyst for Douglas-fir beetle-caused mortality in other western states, it does not appear to play a significant role in California. Only two reports have documented fire as a predisposing factor to Douglas-fir beetle activity in California from 1953-2010. In 1955, the 70,000 acre Haystack Burn northwest of Yreka (Siskiyou Co., M261A) was a catalyst to a bark beetle situation reported in 1957 (FHP Report 58-03). Douglas-fir beetle was documented in badly burned Douglas-fir, but the primary agent was western pine beetle (*Dendroctonus brevicomis*) in fire-injured ponderosa pine. In the 1959, 2,700 acre Mine Fire near the Hoopa Indian Reservation, only the occasional tree and a few groups were infested by Douglas-fir beetle (FHP Report 61-14). CALFIRE plant pathologists and entomologists have also noted very low levels of Douglas-fir beetle activity in fire-injured trees (J. Marshall, personal communication, 2011). In a prescribed fire unit in Humboldt Co., one fire-scorched tree with *Phaeolus schweinitzii* root disease was attacked. Two years after the 2008 lightning complex caused over 100 fires in Mendocino Co. (M261B), only one known fire scorched Douglas-fir was observed as having been attacked. Likewise, the result of Forest Health Protection surveys of dead and dying fire-injured Douglas-fir in the 2007 Moonlight Fire on the Plumas NF (M261E) revealed just one attacked tree. The Moonlight Fire survey also revealed an overwhelming predominance of flatheaded fir borer (*Melanophila drummondi*), suggesting severe competition for the ephemeral resource of stressed fire-injured Douglas-fir, and a possible explanation for the apparent lack of Douglas-fir beetle activity.

California Forest Health Pest Conditions and Activity 2011 At-a-glance

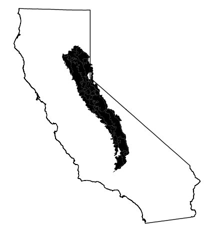
By: Tom Smith

In 2011, California received abundant precipitation for the second year in a row (100% of normal for water year 2010 and 145% of normal for water year 2011). Also, both years experienced late spring/early summer rains. The abundant rainfall had profound impacts on forest pests in the state, leading to decreases in most bark beetle activity and other insects, and increases in certain diseases. The late season rainfall may also impact certain disease problems in years to come with infections by diseases such as sudden oak death not manifesting until years after late rain events.



M261G

Bark beetle-caused mortality generally declined throughout California in 2011. Most of this reported decline can be attributed to the abundant precipitation that the state received over the last two years since stand conditions in most areas did not improve and continue to be vulnerable to elevated levels of bark beetle activity during drought periods. Traditionally, dense stocking, altered species composition, and high levels of disease are all contributing factors that increase stand susceptibility to bark beetles in many California forests.



M261E

Fir engraver beetle activity declined dramatically with some areas reporting a 50-75% reduction in mortality from 2010 levels. This level of decline was consistent with past observations of rapid decreases in fir engraver beetle activity with increasing precipitation. Western pine beetle-caused mortality in ponderosa pine remained at levels similar to 2010 in most areas. The largest bark beetle concern in California for 2011 continued to be mountain pine beetle activity in high elevation pine species, especially whitebark pine. Mountain pine beetle-caused mortality in lodgepole and whitebark pine reached stand replacing levels in several locations such as the Warner Mountains of northeastern California (M261G) and High Meadows of the Lake Tahoe Basin (M261E), where most of the suitable lodgepole pine host is now depleted. Jeffrey pine beetle activity remained very low throughout the state in 2011.

Insect Activity Highlights

- Bark beetle activity declined statewide
- The major bark beetle concern was stand replacing mountain pine beetle-caused mortality of high elevation whitebark and lodgepole pines in the Warner Mountains
- Fir engraver beetle activity declined from 50 - 75% of the 2010 levels
- The Douglas-fir tussock moth outbreak on the San Bernardino NF declined in both intensity and acreage
- Black oak leaf blotch miner feeding affected approximately 9,000 acres of Tahoe NF
- Goldspotted oak borer continued to kill native oaks over a 30 square mile area of San Diego Co.
- 3 new beetle species were reported in California

M262B

M261F

The Douglas-fir tussock moth outbreak on the San Bernardino NF (M262B) declined in both intensity and number of acres affected in 2011. Some areas experienced white fir mortality due to fir engraver beetle attacking trees that had high levels of defoliation. Douglas-fir tussock moth populations continued to remain at background levels throughout the remainder of the state.

M261B

Black oak leaf blotch miner activity increased again in both intensity and number of acres on the Tahoe NF (M261E) in 2011. Approximately 9,000 acres of black oak experienced an average loss of 75% of their leaf surface area due to feeding by the micro moth, *Eriocraniella aurosparsella*. This was the highest level of defoliation since the outbreak began in 2005.

Other defoliation reported in 2011 that attracted interest from local private property owners included fall webworm feeding on pacific madrone in the Sierra foothills (M261F) and northern Coast Range (M261B), California oakworm feeding on coast live oak in the Carmel and Monterey areas (261A), and white fir sawfly feeding in private timberland in Plumas Co. (M261E).

261A


M261D

A black pineleaf scale outbreak caused significant damage to ponderosa pine stands bordering valley bottoms and agricultural land in the Burney and Fall River areas of northeastern California (M261D). Some of the affected trees were subsequently killed by the western pine beetle. This outbreak created some local controversy over pesticide use (both for agriculture and mosquito abatement) and its potential impact to natural enemies of the black pineleaf scale.


M262B

Invasive forest insects reported in 2011 include the goldspotted oak borer, European gypsy moth, and three new bark beetle species previously unknown to California. The goldspotted oak borer continued to dominate the news in southern California where it has killed thousands of native oaks within San Diego Co. (M262B) since 2002. The European gypsy moth proved to be a persistent threat to California trees as adults, pupae, and larvae were detected during annual trapping surveys and intercepted at Border Protection Stations in 2011. Also in 2011, three beetle species, previously unknown from California, were detected through the Red Bay Ambrosia Beetle Survey and from infested incense cedar fence boards shipped from Louisiana. These were a bark beetle, *Araptus schwarzi* (Blackman), a seed beetle, *Pagiocerus frontalis* (Fabricius), and an ambrosia beetle, *Xylosandrus crassiusculus*.


M261E

The higher than average precipitation statewide that affected insect activity also impacted disease conditions throughout California. Most of the state had significantly more precipitation than average with rain continuing to fall in the late spring and early summer. Cool spring temperatures along with the high rainfall led to a marked increase in many foliar diseases of both conifers and hardwoods. Oak and sycamore anthracnose, madrone leaf blight, western gall rust, elytroderma needle disease, and conifer needle cast diseases all increased in frequency and severity. Also, the cool wet conditions will likely lead to a greater incidence in sudden oak death (*Phytopthora ramorum*) in the years to come. Significant snowpacks also led to snow damage in the higher elevations and the foothills of the Sierra Nevada Range (M261E, M261F).


M261F

Sudden oak death was confirmed in a remote outbreak near Redwood Creek in Humboldt Co. (263A). The isolated site was the furthest north that the disease had been found in California and represents a significant threat to a previously uninfested, but highly susceptible, region of the state. Efforts began to attempt to control or suppress the disease in the infested area. Elsewhere in the state, control efforts continued in isolated outbreaks and surveys (aerial, ground, and stream baiting) were conducted to detect any further spread of the disease.


263A

Port-Orford-cedar root disease was confirmed at the Saint Germain Foundation Retreat (formerly Shasta Springs) north of Dunsmuir (M261A). The disease occurs along a trail that traverses the springs for which the site was originally named. The infested stand has one of the highest concentrations of Port-Orford-cedar trees in the upper Sacramento River canyon. Other root diseases of note in the state included Heterobasidion root disease, Armillaria root disease, and black stain root disease.


M261A

Disease Activity Highlights

- Foliar diseases such as oak and sycamore anthracnose and elytroderma needle blight of pines increased due to late season rainfall and cool temperatures
- Sudden oak death was found at an isolated site near Redwood Creek in Humboldt Co. and control activities were initiated
- Port-Orford-cedar root disease was found in one of the highest concentrations of Port-Orford-cedar trees in the upper Sacramento River Canyon
- Western gall rust caused significant branch dieback in the central foothills of the Sierra Nevada Range
- No new forest diseases were reported in California in 2011
- Heavy snowpacks caused damage to higher elevation trees in the central Sierra Nevada Range

Maple leaf scorch disease continued to increase in various parts of northern California. The bacterium that causes Pierce's disease is being investigated as the possible cause of the scorch.

No new exotic diseases were identified in the state in 2011. However, well established exotic diseases such as pitch canker, sudden oak death and

white pine blister rust continued to cause damage to the state's forest resources.

Vertebrate animal damage remained a problem in California. Although most animals did not cause economic damage there were exceptions, particularly black bear damage in the north coastal counties. Many vertebrate animals remained difficult to control due to regulatory and societal protection.

Animal Damage Highlights

- Black bears caused economic damage to coast redwoods on the north coast by stripping bark from the trees and black bear damage was reported from Mendocino County for the first time
- Norway rat damage was reported on coast redwoods in San Francisco
- Feral hog damage appeared to be increasing
- Branch girdling by gray squirrels was reported on bigleaf maple and planted urban landscape elm trees

A new progression of bear damage reached Mendocino County's north coast. Black bears girdled the bases of grand fir and top-killed some of the large redwoods near the mouth of the Ten Mile River drainage. On the large redwoods, girdling began some 60 feet up the bole of the trees. In recent years bear damage greatly increased in the north coast region of California.

Invasive plants remained a major concern throughout California in 2011. Invasive plants cause damage to ecosystems, change plant community structure, and disrupt physical ecosystem processes. The impact has been especially severe in California with its rich diversity of natural resources. In 2011, approximately 1,800 non-native plants were known in the state including about 200 considered to be invasive. Control efforts were hampered in 2011 due to severe state budget cuts including loss of the state noxious weed program that had been operating since 1894. Also, new state funding to counties and Weed Management Areas (WMA) for invasive plant work was eliminated.

Invasive Plant Highlights

- New species reports to California included shiny geranium, Canary Island and Large Leaf St. John's Wort (first known North American occurrence), yellowtuft alyssum, and licorice plant
- Yellowtuft alyssum is still (as far as we know) in Southern Oregon. Its inclusion in this report is as an early warning that it is on the move and headed our way
- Yellow star thistle infested approximately 20 million acres of California and had increased germination and survival due to the previous wet winter
- Numerous efforts to contain yellow star thistle continued in an attempt to slow the spread of the species, particularly into higher elevations of the Sierra Nevada Range
- Eradication or containment efforts existed against various knapweeds, saltcedar, Dalmatian toadflax, numerous thistle species, perennial pepperweed, various spurges, red sesbania, tree-of-heaven, various brooms, cheat grass, arundo, blackberry, rush skeletonweed, dyer's woad, and cape ivy

Insect Conditions in Brief

By Danny Cluck

Bark beetle-caused mortality generally declined throughout California in 2011. Most of this reported decline can be attributed to the abundant precipitation that the state received over the last two years (100% of normal for water year 2010 and 145% of normal of water year 2011). Nonetheless, stand conditions in many areas have not improved. These areas will continue to be vulnerable to elevated levels of bark beetle activity during drought periods. Dense stocking, altered species composition, and high levels of disease are all contributing factors that increase susceptibility to bark beetles in many California forests.

Fir engraver beetle activity declined dramatically with some areas reporting a 50-75% reduction in mortality from 2010 levels. This level of decline is consistent with past observations of rapid decreases in fir engraver beetle activity with increasing precipitation. Western pine beetle-caused mortality of ponderosa pine remained at levels similar to 2010 in most areas, while mountain pine beetle continued to cause high levels of mortality in whitebark and lodgepole pine within ongoing outbreak areas. Reductions in populations of western pine beetle are typically delayed as it may take two or more years for host trees to recoup their defenses against attacks. Mountain pine beetle populations may not respond at all to wetter conditions as long as suitable host material remains, such as an abundance of larger diameter (>8” DBH) lodgepole pine. Jeffrey pine beetle activity remained very low throughout the state in 2011.

The largest bark beetle concern in California for 2011 continued to be mountain pine beetle activity in high elevation pine species, especially whitebark pine. Mountain pine beetle activity in California whitebark pine stands will likely receive even more attention due to the recent determination of white bark pine as a Candidate Species by the US Fish and Wildlife Service. Mountain pine beetle-caused mortality in lodgepole and whitebark pine has reached stand replacing levels in several locations such as the Warner Mountains of northeastern California (M261G) and High Meadows of the Lake Tahoe Basin (M261E) where most of the suitable lodgepole pine host has been depleted.

The Douglas-fir tussock moth outbreak on the San Bernardino NF (M262B) declined in both intensity and number of acres affected in 2011. Some areas experienced white fir mortality due to fir engraver beetle attacking trees that had high levels of defoliation. Douglas-fir tussock moth populations continue to remain at background levels throughout the remainder of the state.

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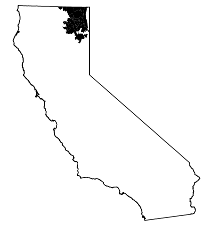
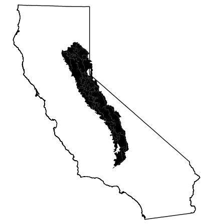
Other defoliation reported in 2011 that attracted interest from local private property owners included fall webworm feeding on pacific madrone in the Sierra foothills and northern Coast Range (M261F, M261B), California oakworm feeding on coast live oak in the Carmel and Monterey areas (261A) and white fir sawfly feeding in private timberland in Plumas Co. (M261E).

A black pineleaf scale outbreak caused significant damage to ponderosa pine stands bordering valley bottoms and agricultural land in the Burney and Fall River areas of northeastern California (M261D). Some of the affected trees were subsequently killed by the western pine beetle. This outbreak created some local controversy over pesticide use (both for agriculture and mosquito abatement) and its potential impact to natural enemies of the black pineleaf scale.

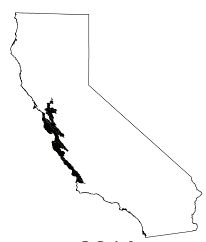

M261G

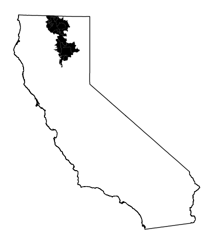

M261E


M262B


M261F


M261B


261A


M261D

M262B

Invasive forest insects reported in 2011 include the goldspotted oak borer, European gypsy moth, and three new beetle species previously unknown to California. The goldspotted oak borer continued to dominate the news in southern California where it has killed thousands of native oaks within San Diego Co. (M262B) since 2002. The European gypsy moth proves to be a persistent threat to California trees as adults, pupae and larvae were detected during annual trapping surveys and intercepted at Border Protection Stations in 2011. Also in 2011, two beetle species, previously unknown to California, were detected through the Red Bay Ambrosia Beetle Survey. These were a bark beetle, *Araptus schwarzi* (Blackman) and a seed beetle, *Pagiocerus frontalis* (Fabricius). Another beetle, *Xylosandrus crassiusculus* (an ambrosia beetle) was detected in infested incense cedar fence boards shipped from Louisiana.

Insect Conditions

Invasive Insects

Goldspotted oak borer
Agrilus auroguttatus
Contribution by: Tom Coleman

Elevated levels of oak mortality from the goldspotted oak borer continued in San Diego Co. for the tenth consecutive year. An estimated 1,305 acres were aerially mapped around the Descanso Ranger District, Cleveland NF (San Diego Co., M262B). Large diameter coast live oak and California black oak continue to be impacted by this new exotic beetle. High-levels of oak injury and mortality from the goldspotted oak borer continued around the communities of Guatay and Pine Valley. The infestation is still believed to be isolated to San Diego Co.; however, one satellite infestation is known within the county (Marion Bear Memorial Park, San Diego, California) and is likely a result of moving infested firewood.

Fig 2: Goldspotted oak borer-caused mortality in canyon live oak, Cleveland NF.

Photo: T. Coleman

M262B

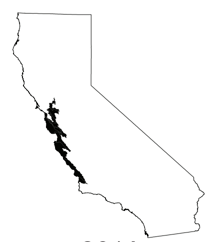
European Gypsy Moth
Lymantria dispar
Contributions by: Sheri Smith and California Department of Food and Agriculture

In 2011, one European gypsy moth was trapped in Los Angeles Co. (261B) and one gypsy moth pupa was found at an Alameda Co. (261A) residence during a follow-up site visit after household goods were allowed entry into the state under a hold notice. In addition, multiple life stages of gypsy moths were intercepted at Border Protection Stations (see table below).

261B

Border Protection Station	2011 Interception Dates	Host/Material Found On
Blythe	1 March	Vehicle
Blythe	7 March	Moving Pods
Truckee	24 May	Moving Pods
Truckee	13 June	Apple Tree
Needles	15 June	Tool Box
Needles	18 June	Moving Pods
Truckee	18 June	Container
Needles	7 July	Moving Pods
Needles	12 July	Movong Pods
Needles	12 July	Oak
Truckee	4 August	Oak
Needles	14 August	Vehicle
Needles	28 August	Apple
Needles	5 September	Firewood
Needles	5 September	Household Goods
Needles	14 September	Household Goods

Table 1: European gypsy moth interceptions, 2011



261A

M261A

Asian Longhorned Beetle
Anoplophora glabripennis
Contribution by: Cynthia Snyder

A single suspected Asian longhorned beetle was received by the Northern California Shared Service Area in 2011 from the Six Rivers NF (M261A). The specimen was identified as a banded alder beetle, *Rosalia funebris*. The banded alder beetle is an exotic looking native beetle with striking bluish-white and black banding that is infrequently encountered from March to July in the Pacific Northwest. Two other reports by the public were made regarding suspected Asian longhorned beetle; these were identified by the California Department of Food and Agriculture (CDFA) in Yreka as native pine sawyers.

Granulated Ambrosia Beetle
Xylosandrus crassiusculus
Contribution by: Don Owen

262A

An infestation of granulated ambrosia beetles was intercepted when beetle-infested incense cedar fence boards were shipped from Louisiana to Sierra Pacific Industries Headquarters in Anderson (Shasta Co., 262A). The boards were milled in California, but sold and put in use in Louisiana. The purchaser mailed 3 pieces of board back to SPI complaining of an insect infestation. The infestation was something never seen by SPI employees, so they kept the boards under refrigeration and requested an evaluation. The beetles were identified as *Xylosandrus crassiusculus*, an invasive species native to Asia. This beetle is well established in the SE United States, but is not known to occur in CA - it is a Q-rated pest by CDFA. The infestation apparently occurred in Louisiana. All of the infested pieces of board were destroyed.

Fig 3: Red gum lerp psyllid on eucalyptus leaf.

Photo: K. Camilli

Red Gum Lerp Psyllid
Glycaspis brimblecombei
Contribution by: Kim Camilli

An urban forester in the Fallbrook area, north of San Diego (San Diego Co., 261B), reported that there are many eucalyptus trees that are stressed from red gum lerp psyllid infestations. Leaf drop is premature in these trees and infested leaves are covered with sooty mold. This is the first year of infested and stressed trees in the area, so trees should recover fully unless the infestation continues.

261B

Redhaired Pine Bark Beetle
Hylurgus ligniperda (Fab.)
Contribution by: Curtis Takahashi

The redhaired pine bark beetle expanded its range in California in 2011. Detected in Santa Clara Co. (261A), this beetle was previously only known from Southern California.

261A

New Beetle Detections
Araptus schwarzi (Blackman)
Pagiocerus frontalis (Fabricius)
Contribution by: Curtis Takahashi

Araptus schwarzi (Blackman) was detected in San Diego Co. (M262B). This species has been previously collected in the Mexican state of Michoacan, the historical center of Mexican commercial avocado production. This beetle has never been reported to be a pest and never shown any pattern of damage that could be attributed to the insect. They prefer cut or injured host material, including the recently fallen fruit containing large seeds.

M262B

Pagiocerus frontalis (Fabricius) was also detected in San Diego Co. (M262B). This species was unknown from the west and from California. This beetle attacks seeds and has several hosts, including corn.

Native Insects

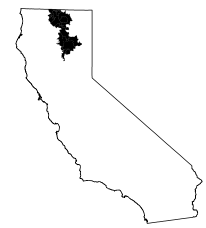
Bark Beetles

Jeffrey Pine Beetle
Dendroctonus jeffreyi
Contributions by: Amanda Grady, Beverly Bulaon and Danny Cluck

Jeffrey pine mortality caused by Jeffrey pine beetle was very limited throughout the state in 2011. Only a few locations were reported where activity is stable to increasing, both in northeastern California. Areas within the Lake Tahoe Basin and locations within Lassen Volcanic NP saw continued or increasing levels of tree mortality but overall were still very limited in total numbers of trees and acres affected. The southern Sierras only experienced scattered mortality, while activity reported in southern California was restricted to previous wildfire areas. More specific information on location, host species, and number of trees or acres affected is provided below.

M262B

Jeffrey pine mortality caused by Jeffrey pine beetle was detected on the San Bernardino NF (San Bernardino Co., M262B) within the boundaries of the 2007 Slide, Sheep, and Butler fires.



M261D

At the northwest entrance visitor center in Lassen Volcanic NP (Shasta Co., M261D), approximately 20 Jeffrey pine trees were killed this year ranging from 8-15” DBH. Mortality in this location began in 2010 and was likely associated with root compaction and disturbance from the construction of a nearby visitor’s kiosk. Five large diameter (>25” DBH) Jeffrey pines were also mass attacked in a dense stand approximately ½ mile south of the kiosk. At Martin Springs, Lassen NF (Lassen Co., M261D), approximately 5-10 small diameter Jeffrey pines were killed by Jeffrey pine beetle.

Fig 4: Pitch tubes on Jeffrey pine beetle-attacked Jeffrey pine, Mill Creek Campground, Plumas NF.

Photo: D. Cluck

Ten Jeffrey pines were attacked and killed by Jeffrey pine beetle in the Sundew Campground at Bucks Lake, Plumas NF (Plumas Co., M261E). These trees appeared to be impacted by excessive compaction within campsites and adjacent to campground loop roads. During a site visit, two trees were found actively pitching out attacking beetles. These trees had hundreds of pitch tubes on their boles.

M261E

Jeffrey pine beetle activity was limited in the southern Sierra forests. Single Jeffrey pines were attacked and killed on exposed sites on the Sequoia NF (Tulare Co., M261E). These trees were initially damaged by winter storms. There were also attacked trees on the Inyo NF (Mono Co., 341D) that were growing in close proximity to geothermal release sites. Underground heat is most likely compromising growth and some trees have been directly killed by heat.

Fig 5: Recent geothermal-caused mortality, Mammoth Lake RD, Inyo NF.

Photo: B. Bulaon

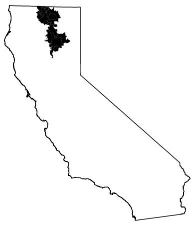
341D

The Lake Tahoe Basin Management Unit continues to experience losses of Jeffrey pine in its most popular visitor areas and campgrounds, such as the Tallac Historic Site (El Dorado Co., M261E). Most of this mortality is related to poor soils and high stand density.

Mountain Pine Beetle

Dendroctonus ponderosae

Contributions by: Beverly Bulaon, Danny Cluck, Tom Coleman, and Cynthia Snyder



M261D

M261G

341D

Mountain pine beetle continued to cause high levels of mortality of pine species in 2011. Similar to last year, the most significant mortality areas were whitebark and lodgepole pine stands on Mt. Shasta (Siskiyou Co., M261D), the Warner Mountain range (Modoc Co., M261G), and the areas surrounding June Mountain (Inyo Co., 341D). Mountain pine beetle-caused mortality of whitebark pine continues to be a concern in California as well as throughout the rest of the tree's range. Whitebark pine was listed as a "Candidate Species" by the US Fish and Wildlife Service in July of 2011 due to the recent widespread mortality of this species, mostly as a result of the current mountain pine beetle outbreaks and ongoing susceptibility to white pine blister rust. Candidate species are plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. This designation does not carry any statutory protection under the Endangered Species Act. Mountain pine beetle was also reported in western white pine and sugar pine, which are both susceptible to white pine blister rust. More specific information on location, host species, and number of trees or acres affected is provided below.

Mortality of whitebark pine continued in an 80-acre area on Bolam Bench, on the northern flank of Mt. Shasta, Shasta-Trinity NF (Siskiyou Co., M261D). Mountain pine beetle-killed trees in this stand are heavily infected with limber pine dwarf mistletoe, *Arceuthobium cyanocarpum*, and were first noted in 2009 following a severe drought.

Mountain pine beetle activity in lodgepole and whitebark pines also continued throughout northeastern California. In the Warner Mountains of the Modoc NF (Modoc Co., M261G), where most mature stands of lodgepole pine have been killed during the ongoing 6-year outbreak, mountain pine beetles are now attacking larger diameter western white pines and extending further into pure whitebark pine stands that were previously experiencing only limited activity. Some relatively isolated whitebark pine stands that had large pockets of mortality from previous years appear to be experiencing less mortality in 2011, even though suitable hosts still remain. Sampling of 2010 attacked whitebark pines in these areas revealed that brood success was minimal to non-existent in several trees for unknown reasons. Lodgepole pine also continued to be attacked and killed (~4 trees/acre) at Medicine Lake, Modoc NF (Siskiyou Co., M261D) but at lower rates than the previous two years even though suitable host material is abundant over this 3,000 acre area. On the Lassen NF, mountain pine beetle continued to kill the few

Fig 6: Mountain pine beetle-killed whitebark and lodgepole pines on June Mtn Ski Area, Inyo NF.

Photo: B. Bulaon

Fig 7: Whitebark pine mortality caused by mountain pine beetle, Warner Mountains, Modoc NF.

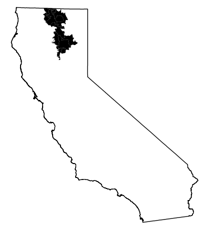
Photo: D. Cluck

Fig 8: Lodgepole pine mortality caused by mountain pine beetle, Medicine Lake, Modoc NF.

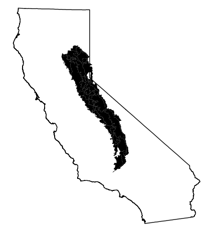
Photo: D. Cluck

Fig 9: Small group of mature sugar pine attcked by mountain pine beetle near Blackjack Spring, Mendocino NF.

Photo: C. Snyder



M261D



M261E

341D

remaining suitable lodgepole pine near Ashpan Butte and Bunchgrass Valley (Shasta Co., M261D).

Mountain pine beetle activity in lodgepole pine stands throughout eastside forests within the Lake Tahoe Basin Management Unit and Eldorado NF has mostly subsided. Beetles continue to attack a few trees on stressed sites near meadow edges, roadways, or areas that were historically dominated by Jeffrey pine. Areas such as High Meadows in the Lake Tahoe Basin (Eldorado Co., M261E) continue to see mountain pine beetle activity move into new areas, but overall mortality levels have diminished since 2009.

Ground surveys confirmed mountain pine beetle populations remain high in upper montane whitebark pines on the Inyo NF (Inyo and Mono Counties, 341D). Three main drainages continue to see unprecedented mortality levels: Rock Creek, Glass Creek, and Gibbs Canyon. Mortality on the Forest continues to spread north to south along mountain ranges into new areas. Wilderness areas have been most heavily affected and visitors are noting the increase of red needled trees on the landscape. Foresters on the Carson Ranger District, Toiyabe NF (Inyo Co., 341D) also noted new mortality of whitebark pine around Twin Lakes.

Fig 10: Mountain pine beetle-killed legacy sugar pine, Pinecrest Recreation Area, Stanislaus NF.

Photo: M. Mackenzie

M261B

Mountain pine beetle activity increased in sugar pine in 2011. It was found causing mortality in several scattered large sugar pine near Blackjack Spring in the Grindstone Creek watershed, Mendocino NF (Tehama Co., M261B), and in approximately 10 large diameter white pine blister rust infected sugar pines in the North Battle Creek area, Lassen NF (Shasta Co., M261D).

Large diameter sugar pines also continued to die from a combination of overly dense stands, white pine blister rust, and mountain pine beetles

Fig 11: Pocket of mountain pine beetle-caused mortality in ponderosa pine near Lake Juanita CG, Goosenest LSR, Klamath NF.

Photo: C. Snyder

M261E

in mixed conifer forests of the southern Sierra Nevada range. Sugar pine dwarf mistletoe also appears to be a contributing factor in increasing susceptibility to mountain pine beetle attacks in some areas. For example, in mixed conifer stands in the Greenhorn Mountains of the Sequoia NF (Tulare Co., M261E), sugar pines infected by white pine blister rust and/or dwarf mistletoe are dying at an increasing rate. Most of these declining trees are succumbing to mountain pine beetles. Sugar pines (mostly >20” DBH) comprise less than 10% of stand composition in this area but were attacked at a rate of two trees per acre in some areas. Stand densities in this area were ≥220 sq.ft./acre. Mortality from previous years was frequently found near recently attacked trees. This trend continued further north along the Western Divide Highway (Tulare Co., M261E) and General’s Highway, Sequoia-Kings NP (Fresno Co., M261E), where scattered large diameter sugar pines could be seen fading on the hillsides. In the Pinecrest Recreation Area housing tracts of the Stanislaus NF (Tuolumne Co., M261E), mountain pine beetle-attacked legacy sugar pines are creating significant hazards to residents as many of them are located next to homes.

M262B

Mountain pine beetle and pinyon Ips killed singleleaf pinyon pine near the Cougar Crest trailhead on the San Bernardino NF (San Bernardino Co., M262B). Armillaria root disease and black stain root disease were detected in the area and are likely predisposing trees to attack. Several pockets of tree mortality were present near the trailhead, killing approximately 17 pines in a three acre area. Tree mortality has persisted in this area for a couple of years, but increased mortality was observed in 2011.

M261D

Mountain pine beetle-caused mortality of ponderosa pine was noted in several 5-15 tree groups across 75 acres of the Goosenest Late Successional Reserve near Juanita Lake, Klamath NF (Siskiyou Co., M261D).

Western Pine Beetle
Dendroctonus brevicomis
Contributions by: Beverly Bulaon, Danny Cluck, Tom Coleman, Amanda Grady, Jack Marshall, Don Owen, and Cynthia Snyder

M261B

Western pine beetle activity was stable to increasing in most locations despite above average precipitation. Ponderosa pine with black stain root disease in northern California saw sharp increases in western pine beetle activity, while areas of elevated activity in southern California were mostly restricted to ponderosa and Coulter pine within previously burned areas. Western pine beetle was reported at slightly elevated levels in most locations of northeastern California while the southern Sierra Nevada range saw elevated mortality levels mostly in lower elevation ponderosa pine plantations.

A few fire-scorched ponderosa pines were killed by western pine beetle in Boggs Mountain Demonstration State Forest (Lake Co., M261B). No root diseases were associated with the attacked trees.

The McCloud Flats area of the Shasta-Trinity NF (Siskiyou Co., M261D) continued to have extensive bark beetle-caused mortality due to overstocking and black stain root disease in stands still recovering from the extended drought. The Pilgrim Creek area on McCloud Flats

had extensive ponderosa pine mortality across nearly 7,000 acres with 2-30 trees per acre being affected in 2011.

Western pine beetle mortality was also noted in areas with dense stocking where endemic beetle populations had built up during the 2006-2009 drought and trees had not yet recovered sufficiently to keep populations in check. This was evident in the Singleton Late Successional Reserve, Klamath NF (Siskiyou Co., M261A), where there were several large pockets (5-25 trees) of western pine beetle-caused mortality along with green infested trees showing multiple successful and unsuccessful attacks within a 75 acre area.

Fig 12: Western pine beetle attacks on ponderosa pine in Singleton LSR, Klamath NF.

Photo: C. Snyder

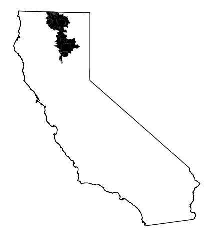
M261A

No beetle-killed ponderosa pines could be found on several properties that experienced significant western pine beetle activity during the past 3 years in the Shingletown area (Shasta Co., M261D). Western pine beetle activity peaked in 2009, continued into 2010, but by the end of last year had decreased substantially.

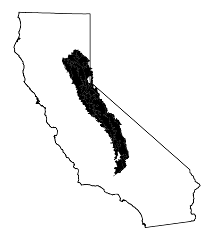
Scattered, low vigor ponderosa pines were killed by western pine beetle in areas impacted by the black pineleaf scale in the Burney and Fall River areas. Mortality occurred around Goose Valley and in the vicinities of Black Ranch and Dee Knoch Roads (Shasta Co., M261D).

Fig 13: Ponderosa pine mortality caused by western pine beetle, Moonlight Fire area, Plumas NF.

Photo: D. Cluck



M261D



M261E

Approximately 15 acres of ponderosa pine adjacent to the 2007 Moonlight Fire, Plumas NF (Plumas Co., M261E), were attacked and killed by the western pine beetle. There have been high levels of western pine beetle activity in fire-injured trees in the adjacent burned area every year since the fire, and it is likely that this year's mortality is related to this past activity. It is not common for western pine beetle to build up in fire-injured trees and then attack adjacent unburned trees in California. However, this stand was stocked at >240 sq.ft./acre with an average diameter of approximately 16" DBH and had experienced 3 years of drought.

In the south Sierra Nevada range, western pine beetle activity was most dramatic on the Sierra NF (Fresno Co., M261E). The mortality was most evident within the Big Creek watershed and surrounding areas of the High Sierra Ranger District. Mortality was first detected in large polygons in 2009 in many of the older plantations along Peterson Mill Road, Dinkey Creek, and Nutmeg Saddle. Group kills of 60 - 100 trees were found where ponderosa pines comprised 90% of the stand and average diameters were above 15" DBH. In 2011, mortality spread into single large trees (average 25" DBH) that were growing next to older group kills. This most recent mortality appeared to be more associated with snow and wind damage from last winter than with previous bark beetle activity. Snapped off boles, broken limbs, and toppled trees were prime habitat for western pine and other bark

M261E

beetle species. The attraction of beetles to debris and damaged trees may have lead to the observed attacks on small groups of trees, regardless of host size. In other areas, attacked trees were infected with pathogens or had sustained mechanical injury associated with campgrounds or roadsides. For example, in PiPi campground, Eldorado NF (Amador Co., M261E), twenty large trees (> 25” DBH) were recently felled as a consequence of western pine beetle attacks and infection by *Phellinus pini* – a white pocket rot that weakens the stem. Survey of the campground found many more trees infected with this pathogen, but none with new beetle attacks.

Ponderosa pine mortality caused by the western pine beetle was observed on the San Bernardino NF (San Bernardino Co., M262B) within the boundaries of the 2007 Slide, Sheep, and Butler fires. Previous wildfire injury predisposed these trees to injury from western pine beetle populations. Elevated tree mortality has continued within the fire boundaries for the past three years.

M262B

Coulter pine mortality caused by western pine beetle decreased from 2010 levels on Thomas Mountain, San Bernardino NF (San Bernardino Co., M262B). High-levels of rainfall during 2011 likely improved tree health in these dense pine stands and prevented colonization by western pine beetle populations. Tree mortality may subside even more next year because actively infested trees were not observed.

Western pine beetle killed Coulter and ponderosa pine injured previously by the Station wildfire on the Angeles NF (Los Angeles Co., M262B). Pine mortality was observed around the Charlton-Chilao picnic area and campground. Bark beetle populations increased in 2011 in this area and will likely continue to attack fire injured trees in 2012.

263A

Red Turpentine Beetle
Dendroctonus valens
Contributions by: Beverly Bulaon, Don Owen, and Jack Marshall

Two large Monterey pines were severely thinning and dying near a private residence near the town of Caspar (Mendocino Co., 263A). Red turpentine beetle was the only pest found on the trees. Much of the basal circumference had been girdled.

M261D

Red turpentine beetle colonized ponderosa pines killed by western pine beetle in the Burney and Fall River areas (Shasta Co., M261D). Red turpentine beetles were also found attacking ponderosa pine, which had been recently pruned, within the Los Colinas Trailer Park in Burney, Shasta Co. No mortality was observed with this activity.

In the south Sierra, most attacks by red turpentine beetle were associated with western pine beetle-infested ponderosa pine in either mixed-conifer forests or in older plantations. The most severe areas of attack were found with the large western pine beetle outbreak occurring in the Big Creek watershed of the High Sierra Ranger District, Sierra NF (Fresno Co., M261E). Groups of dead western pine beetle-attacked ponderosa pines were either attacked by red turpentine beetle in the year prior to or concurrently with the western pine beetle attacks. Ponderosa pines of all sizes have experienced heavy snow/wind injury in this drainage for the past two years and red turpentine beetle, as well as pine engravers, can be found in damaged or snapped off trees. Green trees near older western pine beetle infested trees were still being attacked by red turpentine beetles this year.

Douglas-fir Beetle
Dendroctonus pseudotsugae
Contribution by: Jack Marshall

In most cases, incidence of Douglas-fir beetle along the north coast were again incidental attacks of trees either declining from root disease (commonly Armillaria or black stain root disease), moderate-to-severe scorching from fire, or partial girdling from black bears. However, in 2011 Douglas-fir beetle adults were collected from fresh attacks on a group

of 15-20 downed trees in Redwood Valley (Humboldt Co., 263A) in May. Some trees were isolated individuals, but most were involved in a large earth flow event that occurred in the late spring (many trees still had green tops in June). The event involved mature trees (>30" DBH). Galleries of Douglas-fir beetle were also observed on older downed branches and other debris.

263A

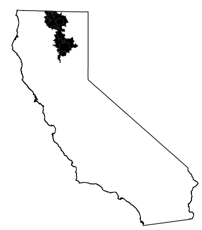
Douglas-fir beetle was associated with the mortality of a few large Douglas-fir in the Hartstone Bible Camp north of Potter Valley (Mendocino Co., 263A). Trees were also attacked by the flatheaded fir borer and *Phaeolus schweinitzii* was present in the area.

Douglas-fir beetle was associated with the mortality of bear damaged Douglas-fir in the Bald Hills area northeast of Orick in Humboldt Co. (263A).

Fir Engraver
Scolytus ventralis
Contributions by: Beverly Bulaon, Danny Cluck, and Cynthia Snyder

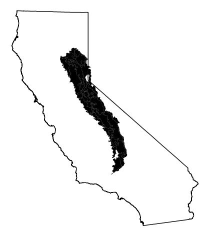
Northern California experienced a continuation of the elevated levels of fir engraver beetle activity as reported in previous years while other areas, including northeastern California and the South Sierra, reported sharp declines in most locations. The only fir engraver beetle activity in southern California was associated with the recent Douglas-fir tussock moth outbreak in white fir. Most reported locations of true fir mortality still list multiple contributing factors, such as root disease and dwarf mistletoe infection, in addition to fir engraver beetle attacks.

Fir engraver beetle activity continued at elevated levels in northwestern California in areas closely associated with overstocking and Heterobasidion root disease infections. A particularly notable occurrence was near Juanita Lake at about 5,500 feet elevation in the Goosenest Late Successional Reserve, Klamath NF (Siskiyou Co., M261D). Branch dieback and whole tree mortality was noticed in scattered patches of 1-5 white fir trees across 200 acres in areas harvested 50-80 years ago. Heterobasidion root disease was confirmed on site and likely established in the stand on the stumps created during that harvest.



M261D

Fir engraver beetle activity decreased by as much as 50% throughout northeastern California in response to two consecutive wetter than normal winters. Areas where fir engraver activity continued were associated with overstocking, dwarf mistletoe, Cytospora canker, and Heterobasidion root disease infections. Fir engraver beetles attacked and killed ~75 small white fir (3-6" DBH) scattered across 20 acres that were growing in close proximity to recently created hand piles near the Placer Big Trees Grove on the Tahoe NF (Placer Co., M261E). Fir engraver beetle activity appeared to be directly related to the abundance of white fir slash found in the hand piles.



M261E

In the southern Sierra Nevada range, true fir losses to fir engraver appear to have subsided to endemic levels in 2011, but are characteristically still the final damage agent in the larger decline complex of root disease, dwarf mistletoe, Cytospora canker, and poor site conditions. Large polygons of dead and dying red fir detected during the aerial survey and later surveyed on the ground revealed that a majority of them were large root disease (*Heterobasidion occidentale*) infection centers. Recent mortality was often part of a declining group of trees being

Fig 14: White fir mortality caused by fir engraver beetle near Big Trees Grove, Tahoe NF.

Photo: D. Cluck

Fig 15: Red fir mortality caused by fir engraver. Root disease was found in nearby stumps, Kern Plateau, Sequoia NF.

Photo: B. Bulaon

Fig 16: Red fir trees dying from expanding underground *Heterobasidion occidentale* root disease infection and fir engraver beetle, Kern River RD, Sequoia NF.

Photo: M. MacKenzie

Fig 17: Pocket of standing ponderosa pines killed by California fivespined Ips emerging from previously infested slash and wind-damaged trees, High Sierra RD, Sierra NF.

Photo: B. Bulaon

Fig 18: Group of small diameter pines attacked by California fivespined Ips after recent thinning treatments. Bass Lake RD, Sierra NF.

Photo: B. Bulaon

M261E

slowly killed in an outward pattern, typical of root disease. The largest trees in the center were killed first (34-45” DBH), their tops previously killed by fir engraver, then mortality progressed outward to surrounding trees. This pattern was perfectly demonstrated in red fir stands on the Kern Plateau, along Sherman Pass, Kern River Ranger District, Sequoia NF (Tulare Co., M261E).

Poor site conditions, such as rocky ground, exposed slopes, or pine-type forests, may explain other detected mortality of true firs in the south Sierra. Many areas with these conditions had scattered dead fir trees with no other damage agents present. Suppression or very dense stands most likely contributed to weakening of many small diameter true firs that were eventually killed by the fir engraver beetle. This type of mortality was widespread in mixed conifer stands of the southern Sierra Nevada range and is often underrepresented in aerial survey since small dead trees are not easily detected from the air. Large areas on the lower west side of the Sequoia NF (Tulare and Fresno Counties, M261E) also experienced scattered fir mortality.

California Fivespined Ips
Ips paraconfusus
Contributions by: Beverly Bulaon and Tom Coleman

California fivespined Ips attacked ponderosa pines in conjunction with western pine beetle around Bass Lake (Madera Co., M261E). A few trees in the vicinity of the western pine beetle group attacks also had top-kill. In addition, a half acre patch in Wrights Creek plantation had top-kill of 10-15” DBH trees (Tuolumne Co., M261E).

Slash and debris left by severe winter storms created abundant habitat for Ips species, primarily in the mid elevations where pine dominates. Large branches and toppled trees provided prime habitat for initial

populations to develop. Adjacent damaged trees were subsequently attacked by the emerging beetle populations. Tight groups of naturally regenerating ponderosa pines were easily bent or broken by snow generating large piles of green slash. Pockets of 20-100 small diameter trees were injured and killed in the Big Creek watershed by a combination of California fivespined Ips and western pine beetle on the Sierra NF (Fresno Co., M261E). Due to above normal rainfall, pine engravers only attacked where slash had developed or trees had been injured, primarily in recently treated young plantations on the Sierra NF (Mariposa Co., M261E).

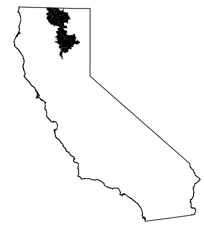
M262B

California fivespined Ips and California flatheaded borer continued to kill Jeffrey pine in dense conifer stands on the Los Padres NF (Kern Co., M262B). Tree injury and mortality has persisted in this area for several years, though top-kill and whole tree mortality decreased from 2010 levels. Tree injury from the California fivespined Ips was linked with Heterobasidion root disease pockets in numerous areas on the district.

341D

Pinyon Ips
Ips confusus
Contributions by: Beverly Bulaon and Tom Coleman

Pinyon Ips was confirmed in an area north of Bridgeport, Humboldt-Toiyabe NF (Mono Co., 341D). Mortality was scattered but visible from the highway. Average diameters of trees ranged from 16-20 inches. Dry site conditions and recent drought have most likely contributed to attacks.



M261D

Singleleaf pinyon pine infected with black stain root disease continued to be attacked by the pinyon Ips on the San Bernardino NF (San Bernardino Co., M262B). Red turpentine beetle activity was also present in the vicinity on singleleaf pinyon pine in conjunction with injury from the pinyon Ips. Low-levels of tree mortality continued for the fourth straight year east of Big Bear city, covering an estimated 15 acres.

The pinyon Ips continued to kill singleleaf pinyon pine on the Los Padres NF (Kern Co., M262B). Singleleaf pinyon pine growing in dense stands along the San Emigidio Mountains succumbed to injury from this bark beetle. Dense, wet snowfall recorded during the 2010/2011 winter caused branch and stem breakage and may have increased injury to these pines.

261A

Emarginate Ips
Ips emarginatus
Contribution by: Cynthia Snyder

Ips emarginatus was found, along with mountain pine beetle, infesting ponderosa pine in several patches of 5-15 trees across approximately 75 acres in the Goosenest Late Successional Reserve near Juanita Lake, Klamath NF (Siskiyou Co., M261D).

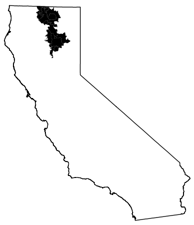
Fig 19: *Ips emarginatus* adult found on dead ponderosa pine in conjuction with mountain pine beetle attack, Goosenest LSR, Klamath NF.

Photo: C. Snyder

Pine Engraver Beetles
Ips spp.
Contribution by: Jack Marshall

Ips were assumed to be involved with the top-kill of large, fire-scorched ponderosa pine within the Martin Fire area near Bonny Doon (Santa Cruz Co., 261A). Engraver beetles have also been killing pitch canker-infected Monterey and Bishop pines in the Point Reyes National Seashore area (Marin Co., 263A).

263A



M261D

Cedar bark beetles
Phloeosinus sp.
Contribution by: Amanda Grady

Cedar bark beetles were found attacking and presumably killing approximately 25-40 small diameter (4-8” DBH) fire-injured incense cedar within the Bridge Campground. These trees were injured during the 2008 Sugar Loaf Fire, Lassen NF (Shasta Co., M261D).

Wood Boring Beetles

263A

Flatheaded Fir Borer
Melanophila drummondi
Contributions by: Danny Cluck, Jack Marshall, and Cynthia Snyder

A high concentration of flatheaded fir borer-killed Douglas-fir was reported in Sonoma Co. (263A) off Trinity Road northeast of Glen Oaks. Mortality has been observed here for the past three years.

Flatheaded fir borer was associated with the mortality of a few large Douglas-fir in the Hartstone Bible Camp north of Potter Valley (Mendocino Co., 263A). Flatheaded fir borer also killed three large Armillaria root disease-infected Douglas-fir in Boggs Mountain Demonstration State Forest (Lake Co., M261B).

Fig 20: Douglas-fir mortality northwest of Yreka, Klamath NF, with evidence of flatheaded wood borers.

Photo: C. Snyder

M261B

M261A

Flatheaded fir borer is responding to stressed white fir and Douglas-fir in low elevation drainages throughout northern California, where it is often associated with Heterobasidion root disease or dwarf mistletoe and fir engraver, or other disease and insect complexes. Of particular note is Douglas-fir mortality in low elevation drainages above the Klamath River on the Klamath NF west of Interstate 5 (Siskiyou Co., M261A). These stands appear to be affected by a canker disease (either *Diaporthe lokoyae* or *Dermea pseudotsugae*), which is reported as relatively common two years after drought. Douglas-fir mortality was also seen scattered along McKinney Ridge, Klamath NF (Siskiyou Co., M261A) where Douglas-fir has invaded natural ponderosa pine and oak forests.

Fire-injured Douglas-fir continued to die off within the 2007 Moonlight Fire on the Plumas NF (Plumas Co., M261E). Approximately 50 recently killed trees were observed within the Lights and Moonlight Creek drainages. Affected trees had sustained major injuries to their boles and root collars. Significant root injury was also suspected but not confirmed.

Defoliators

M261E

Black Oak Leaf Miner
Eriocraniella aurosparsella
Contribution by: Danny Cluck

Blotch mining of California black oak leaves by the black oak leaf miner in the Blue Canyon area, Tahoe NF (Placer Co., M261E), increased dramatically in both affected area and

intensity of defoliation on individual trees. This is the highest level of defoliation covering the largest number of acres since this activity was first detected in 2005. The outbreak now covers an estimated 9,000 acres. This follows a year where defoliation was at nearly the lowest level of this ongoing event. It was previously suggested that the cool and wet spring of 2010 may have suppressed the outbreak. However, this year's high defoliation levels followed the equally cool and wet spring of 2011.

M261D

Douglas-Fir Tussock Moth
Orgyia pseudotsugata
Contributions by: Amanda Grady and Tom Coleman

M262B

Douglas-fir tussock moth trap catches in the fall of 2010 remained extremely low for the 4th consecutive year throughout all areas of northeastern California and the south Sierra (see Table 2, page 26). No white fir defoliation was observed in these areas by 2011 aerial detection survey flights (M261D). 2011 trap catches revealed elevated populations at survey plots on the Tahoe, Lassen, Eldorado, and Stanislaus National Forests, Yosemite NP (M261E), and on private timberland near Burney, CA (M261D). These areas will be monitored in 2012 to detect any defoliation.

Widespread defoliation from Douglas-fir tussock moth declined in 2011 on the Bear Mountain Resort and the San Bernardino NF, Mountaintop Ranger District (San Bernardino Co., M262B). Defoliation injury was observed impacting 10-30% of the crown in 2011, declining from previous years. Tree mortality occurred in forest stands where the outbreak was active for the past three years and extensive defoliation (>95% needle loss) was present. Subsequent attack from fir engraver was also observed on trees with high levels of defoliation. The defoliation encompassed an estimated 400 acres, mostly within the national forest boundary.

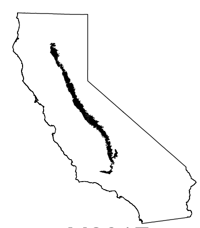
Fig 21: White fir defoliated during the Bear Mountain Douglas-fir tussock moth outbreak of 2006-7. Photo shows the tree in 2007 and 2011.

Photo: D. Owen

Fall Webworm
Hyphantria cunea
Contributions by: Beverly Bulaon, Danny Cluck, and Jack Marshall

Fig 22: Mature alder along Highway 88 (Amador County) severely defoliated by fall webworm.

Photo: B. Bulaon



M261F

Several reports of fall webworm on both madrone and manzanita were received from Lake (M261B), Mendocino, and Humboldt Counties (263A) throughout the late summer and early fall.

Fall webworm also defoliated the entire crowns of many pacific madrones in the Foresthill area (Placer Co., M261F) along the Foresthill Divide Road.

Fig 23: Fall webworm damage on mature madrones along Highway 88 (Amador County).

Photo: B. Bulaon

Fall webworm tents were easily visible on alders, madrones, and even a few cottonwoods located along creek beds and wet meadows in the upper foothills of the Sierras (Calaveras and Amador Counties, M261F). Mature alders were the most severely damaged with 30-50% defoliation. The most severe defoliation was visible between Jackson and Pine Grove along Highway 88

Table 2: Number of Douglas-fir Tussock Moth pheromone detection survey plots by trap catch for 2000-2011 for California

Year	Total # of Plots	NUMBER OF PLOTS WITH AN AVERAGE MOTH CATCH PER TRAP OF:													
		0<10	10<20	20<25	25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%	2%		<1%	1%	1%	1%			<1%		
2001	183	95	57	13	10	6	0	1	1	0	0	0	0	0	0
	100%	52%	31%	7%	5%	3%		<1%	<1%						
2002	168	126	31	5	3	3	0	0	0	0	0	0	0	0	0
	100%	75%	18%	3%	2%	2%									
2003	163	53	42	11	11	10	14	13	3	1	4	0	1	0	0
	100%	32%	26%	7%	7%	6%	8%	8%	2%	1%	2%		1%		
2004	174	68	43	6	16	11	6	5	3	0	2	1	1	0	0
	* 93%	39%	25%	3%	9%	6%	3%	3%	2%		1%	<1%	<1%		
2005	195	139	15	11	7	4	3	2	3	1	0	0	0	1	1
	*95%	71%	8%	5%	4%	2%	2%	1%	2%	<1%				<1%	<1%
2006	164	98	26	8	8	5	3	4	3	4	2	0	1	1	1
	100%	60%	16%	5%	5%	3%	2%	2%	2%	2%	2%		<1%	<1%	<1%
2007	164	157	6	0	0	1	0	0	0	0	0	0	0	0	0
	100%	96%	4%			<1%									
2008	155	155	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	100%													
2009	147	144	3	0	0	0	0	0	0	0	0	0	0	0	0
	*93%	98%	2%												
2010	142	134	6	2	0	0	0	0	0	0	0	0	0	0	0
	*90%	94%	4%	1%											
2011	146	100	23	5	7	5	2	2	1	2	1	0	0	0	0
	*90%	68%	16%	3%	5%	3%	1%	1%	<1%	1%	<1%				

*Some Plots were not collected due to weather

Fig 24: Epicormic branches developing on severely defoliated pinyon pine, Death Valley NP.

Photo: B. Bulaon

Fig 25: Defoliation of California black oak from the fruittree leaf roller on the San Bernardino NF.

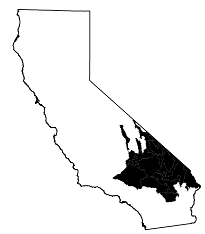
Photo: T. Coleman

(Amador Co., M261F). Fall webworm infestations of madrone were also scattered, with only 5-10% defoliation. Trees with severe damage were typically found in poor locations along roadsides or parking lots.

M261F

Pinyon Sawfly
Neodiprion edulicolus
Contribution by: Beverly Bulaon

Pinyon sawfly defoliation in Death Valley NP (Inyo Co., 322A) continued to linger, but did not intensify or spread to neighboring mountain sides. Severely affected trees appear to have lost all but current year needles, but no mortality has been attributed to the defoliation. Monitoring plots of the most severely affected areas show 90% of trees are affected, regardless of size. Distribution of defoliation on large trees appeared patchy, while smaller trees were so severely defoliated that terminals were killed. In reaction to the feeding and needle loss, trees appeared to be developing new juvenile growth and epicormic branching. This is the third year of this outbreak and populations will continue to be monitored.



322A

Fruittree Leaf Roller
Archips argyrospila
Contribution by: Tom Coleman

For the fourth consecutive year, elevated levels of defoliation occurred on California black oak from the fruittree leafroller on the San Bernardino NF (San Bernardino Co., M262B). Defoliation levels commonly impacted 50% of crowns across 70 acres. Defoliation also occurred at lower levels on canyon live oak and interior live oak. No tree mortality was observed in this area from the defoliation.

Fig 26: Defoliation caused by California oakworm.

Photo: J. Marshall

M262B

California Oakworm
Phyrganidia californica
Contributions by: Kim Camilli and Jack Marshall

Shrub- and tree-sized canyon live oaks were severely defoliated by California oakworm along Bottle Rock

M261B

Road (Lake Co., M261B). The infestation was nearly 5 acres in size.

Aerial detection surveys and follow-up ground surveys by CALFIRE reported 400 acres of defoliation on coast live oak, in Carmel and Monterey (Monterey Co., 261A). Trees are severely defoliated with little to no leaves remaining. The cyclical nature of the insect's population causes it to be more common in some years than in others. This is the first year the attacks have occurred in this area, and a single defoliation event seldom kills affected trees, unless the trees are under some other stress.

Fig 27: White fir sawfly larvae feeding on white fir branch, Plumas NF.

Photo: A. Grady

White fir sawfly
Neodiprion abietis
Contribution by: Danny Cluck and Amanda Grady

Approximately 50 acres of white fir defoliation caused by white fir sawfly feeding was observed on both private and Forest Service land near the town of La Porte (Plumas Co., M261E). Trees of all size classes were nearly stripped of older needles but appeared to have a full complement of new growth.

261A

342B

Elm Leaf Beetle
Xanthogaleruca (=Pyrrhalta) luteola
Contributions by: Danny Cluck and Amanda Grady

Within the communities of Susanville (Lassen Co., 342B) and Adin (Modoc Co., M261G), elm leaf beetles defoliated numerous cultivated elms in public parks and private landscaping.

Fig 28: Black pineleaf scale crawlers on ponderosa pine, Fall River Valley (Shasta County).

Photo: D. Owen

Other Insects

Ponderosa Pine Tip Moth
Rhyacionia zozana
Contribution by: Don Owen

Damage caused by the ponderosa pine tip moth decreased this year in ponderosa pine plantations near Goose Valley (Shasta Co., M261D). A majority of trees in the plantations have now reached a height where continued damage is unlikely.

M261G

Black Pineleaf Scale
Nuculaspis californica
Contribution by: Don Owen

M261D

Black pineleaf scale infestations on ponderosa pine, which were reported last year in the intermountain area of eastern Shasta Co. (M261D), intensified and expanded this year. Infested areas include stands around Goose Valley, Black Ranch Road, Fall River Mills, McArthur and Glenburn. Depending on the location, various factors are compounding the impact of the scale – poor site quality, dwarf mistletoe, western pine beetle activity, and foliage desiccation (red belt) that

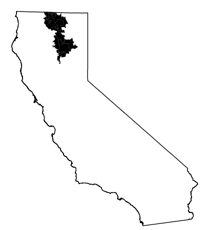
occurred in the winter of 2010. Chlorotic foliage is the most common symptom, but in many areas trees have thin crowns due to poor needle retention and shortened needles. Tree mortality is scattered throughout the most heavily impacted areas and is due, at least in part, to the western pine beetle. The area of the infestation is estimated to be up to 4,000 acres.

Samples were taken in June and July to determine scale development. Scale crawlers were first noted on July 15 and by July 26 many crawlers had settled on new foliage and begun secreting a scale covering. These observations are in agreement with published reports that the crawler stage lasts roughly 2 weeks. A couple of large landowners applied an aerial treatment of Carbaryl on July 26 to control the outbreak.

Black pineleaf scale outbreaks have occurred on ponderosa pine in the intermountain area in the past, and, as has happened before, there has been debate about the role of human activities in contributing to the outbreak. Pesticide spraying, dust, and air pollutants can disrupt the effectiveness of natural enemies of the scale, leading to an increase in scale abundance. While these factors need to be considered, the extent of the current outbreak would additionally suggest that broader, area-wide environmental factors have had an influence on scale populations.

Ponderosa Pine Twig Scale
Matsucoccus bisetosus
Contribution by: Don Owen

Ponderosa pines in the Los Colinas Trailer Park in Burney (Shasta Co., M261D) were suspected of being under attack by the western pine beetle. The manager reported that considerable amounts of outer bark were being flaked off trees, which typically happens when woodpeckers feed on western pine beetle larvae and pupae. Although the damage superficially looked like woodpecker feeding on western pine beetle, it actually was due to other birds feeding on Matsucoccus scale near the tops of trees. The scale is common in the intermountain area (Burney, McArthur, Fall River Mills, etc), but rarely causes tree damage.


M261D

Incense Cedar Scale
Xylococculus macrocarpae
Contribution by: Jack Marshall

Scores of seedling- and small sapling-sized incense cedars near Salmina (Lake Co., M261B) were infested with the incense cedar scale in 2009 and 2010. Heavy infestations led to either direct mortality or ensuing attacks by a species of *Phloeosinus*. Many infested trees have been removed, but the landowner reports some level of infestation remained in 2011.

Needle Fascicle Scale
(likely *Matsucoccus fasciculensis*)
Contributions by: Danny Cluck and Don Owen

In addition to black pine leaf and ponderosa pine twig scales, a third species of scale was found infesting ponderosa pine near Dee Knoch Road, east of Fall River Mills (Shasta Co., M261D). The scale, likely *M. fasciculensis*, was found within sheaths at the base of needle bundles. *M. faciculensis* was also suspected of infesting approximately 300 acres of ponderosa pine west of Susanville on the Lassen NF (Lassen Co., M261E). Very little injury was associated with this activity.


M261E

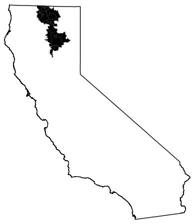
Gouty Pitch Midge
Cecidomyia piniinopis
Contributions by: Jack Marshall and Don Owen

Emerging midges were found along ponderosa pine twigs in sapling-sized trees in Boggs Mountain Demonstration State Forest (Lake Co., M261B). Only a few infested trees were found.


M261B

Fig 29: Gouty pitch midge larva recently emerged from an infested shoot of a ponderosa pine, Moose Camp, Shasta County.

Photo: D. Owen



M261D

Branch tip flagging caused by the gouty pitch midge has decreased across Hatchet Mountain (Shasta Co., M261D). While individual trees are still being damaged, the majority of previously damaged trees show no flagging. Dissection of green shoots from infested trees in 2010 and early 2011 indicated that the number of midges decreased. Low numbers of midges can survive in shoots, but a high population is needed to cause branch flagging.

Hemlock Wooly Adelgid
Adelges tsugae
Contribution by: Jack Marshall

263A

Hemlock wooly adelgid was found infesting three planted western hemlock trees at College of the Redwoods near Eureka (Humboldt Co., 263A). One tree was nearly dead, although it is unlikely that hemlock wooly adelgid was the only factor involved; the other two trees still appeared healthy. Although numerous adelgids were present on infested branches of the two trees, the infestation was confined to the lower branches, and substantial defoliation did not occur.

Lacebugs
Corythuca sp.
Contribution by: Kim Camilli

261B

County of San Diego Department of Agriculture, Weights and Measures, provided information on lacebugs infesting Laurel sumac in Campo and Potrero (San Diego Co., 261B). The leaves of infested shrubs are stippled and bleached from the feeding of adults and nymphs.

Douglas-fir Needle Midge
Contarinia sp.
Contributions by: Jack Marshall

A Contarinina species infested choose-and-cut Douglas-fir Christmas trees grown in Sonoma Co. (263A) near Sebastopol.

Oak Leaf Galls
Antron douglasii
Contributions by: Tom Smith

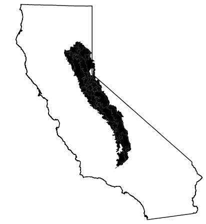
262A

Valley oaks throughout the City of West Sacramento (Yolo Co., 262A) were covered with cynipid wasp galls on their leaves. The galls were not causing any problems for the trees but looked very damaging to landowners and the public.

Sequoia Pitch Moth
Synanthedon sequoiae
Contribution by: Don Owen

Sequoia pitch moths were common on ponderosa pine within the Los Colinas Trailer Park in Burney (Shasta Co., M261D). Tree pruning and other injuries most likely attracted the insects. None of the damage was significant.

Pine Reproduction Weevil
Cylindrocopturus eatoni
Contributions by: Beverly Bulaon and Don Owen



M261E

Up to 60 young (4-5' tall) ponderosa pines were dead or dying from infestation by the pine reproduction weevil in a low elevation plantation east of Manton (Shasta Co., M261D), near the intersection of Ponderosa Way and Rock Creek Rd. Predisposing factors included poor site quality, J-roots from poor planting and Armillaria root disease (refer to Armillaria in the disease section for additional information).

Populations of this insect have finally subsided to low, background levels within monitoring plots on the Stanislaus (Calaveras Co., M261E) and Sierra National Forests (Madera Co., M261E). No signs or symptoms of pine reproduction weevil were found during the 2011 survey.

M261B

Alder flea beetle
Macrohaltica ambiens (= Altica ambiens)
Contributions by: Don Owen, Jack Marshall and Tom Coleman

White alders along Bottle Rock Road, next to portions of Alder and Kelsey Creeks, had severe leaf skeletonizing (Lake Co., M261B). Many of the trees had refoliated by August. Similar damage was reported on alders along Willits Creek near Brooktrails (Mendocino Co., 263A).

Fig 30: White alder leaves skeletonized by alder flea beetle, Lake Co.

Photo: J. Marshall

263A

Defoliation of white alder from the alder flea beetle was scattered throughout riparian areas of the Angeles, Los Padres, and San Bernardino National Forests (Los Angeles, Ventura, and San Bernardino Counties, M262B) and La Jolla Reservation (San Diego Co., M262B). No tree mortality was observed in these areas from this insect. Defoliation levels varied across these areas, but 10-90% of the crown was commonly injured. White alder refoliated following high-levels of feeding from the flea beetle.

Fig 31: White alder severely defoliated by the alder flea beetle in San Gabriel Canyon on the Angeles NF.

Photo: T. Coleman

White alder suffered moderate to heavy defoliation from the alder flea beetle in the Clear Creek drainage above Whiskeytown Lake (Shasta Co., M261A). In the most heavily impacted areas, individual trees were almost completely defoliated by the end of the season.

M262B

Lodgepole Pine Needleminer
Coleotechnites milleri
Contribution by: Beverly Bulaon

M261A

The lodgepole pine needleminer moved further east within Yosemite NP (Madera Co., M261E) in 2011, but recent heavy snow loads may have temporarily dampened population levels. Surveys of infested permanent monitoring plots where lodgepole pine needleminer defoliation has been ongoing for 50 years appeared to have sustained low levels of defoliation compared to previous years. Two sites with no infestation since 2007 (Tenaya Picnic Area and Murphy Creek) were confirmed with lodgepole pine needleminer in 2009 and again

in 2011.

Douglas-fir Twig Beetle
Pityophthorus pseudotsugae
Contribution by: Cynthia Snyder

Douglas-fir twig beetle is responding to stressed Douglas-fir in low elevation drainages on the Klamath NF, west of Interstate 5 (Siskiyou Co., M261A). These stands appear to be affected by a canker disease (either *Diaporthe lokoyae* or *Dermea pseudotsugae*), which is reported as relatively common two years after drought. Twig beetles are taking advantage of trees' weakened condition and whole tree mortality is following as flatheaded fir borer finishes off affected trees.

Fig 32: Douglas-fir twig beetle damage northwest of Yreka, Klamath NF.

Photo: C. Snyder

M261A

Pine Twig Beetle
Pityophthorus confertus and *P. confinis*
Contribution by: Cynthia Snyder

Fig 33: Ponderosa pine twig beetle-caused mortality on Big Signal Peak below Sanhedrin Lookout, Mendocino NF.

Photo: C. Snyder

M261B

There is currently a rather impressive (approximately 450 acre) outbreak of pine twig beetles at 5,800 - 6,100' elevation surrounding Sanhedrin Lookout on Big Signal Peak, Mendocino NF (Mendocino Co., M261B). This outbreak was discovered during the 2011 aerial detection survey by the US Forest Service. The cause of the outbreak is undetermined, but conditions such as poor site quality, overstocking, and extensive brush competition have lead to very unhealthy trees. Twig beetles have also been noted on small ponderosa pines on harsh sites surrounding Shasta Lake, mostly on those with a history of extensive pruning and sequoia pitch moth activity (Shasta Co., M261A).

Scale
Physokermes insignicola
Contribution by: Don Owen

M261D

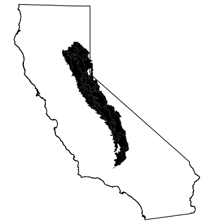
The scale *Physokermes insignicola* was observed on a small number of ponderosa pines infested with black pineleaf scale near Goose Valley (Shasta Co., M261D).

Weevil
Scythropus sp.
Contribution by: Don Owen

Foliage feeding by a species of *Scythropus* occurred on roughly 200 acres of plantation ponderosa pine south of Goose Valley (Shasta Co., M261D). The damage was not serious, but foliage had a distinctive brown/yellow cast from a distance; up close there was heavy feeding on about every third needle.

Disease Conditions in Brief

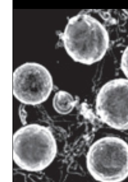
By Tom Smith



M261E

M261F

263A



Most of the state had significantly more precipitation than average with rain continuing to fall in the late spring and early summer. Cool spring temperatures along with high rainfall led to a large increase in many foliar diseases of both conifers and hardwoods. Oak and sycamore anthracnose, madrone leaf blight, western gall rust, elytroderma needle disease, and conifer needle cast diseases all increased in frequency and severity. Significant snowpacks also led to snow damage in the higher elevations and the foothills of the Sierra Nevada Range (M261E, M261F).

Phytophthora ramorum, the fungus that causes sudden oak death, was confirmed in a remote area near Redwood Creek in Humboldt Co. (263A). The isolated site was the furthest north that the disease had been found in California and represents a significant threat to a previously uninfected but highly susceptible region of the state. Efforts began to attempt to suppress the disease in the infested area. Elsewhere in the state control efforts continued in isolated outbreak areas. Surveys including aerial, ground, and stream baiting were conducted to detect any further spread of the disease.

Port-Orford cedar root disease was confirmed at the Saint Germain Foundation Retreat (formerly Shasta Springs) north of Dunsmuir. The disease was found along a trail that traverses Shasta Springs. The infested stand has one of the highest concentrations of Port-Orford-cedar in the upper Sacramento River canyon. Other root diseases appearing throughout the state include Heterobasidion root disease, Armillaria root rot, and black stain root disease.

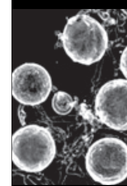
Maple leaf scorch disease continued to increase in various parts of northern California. The suspected bacterial cause of the disease continues to be investigated and surveys to determine the extent of the problem will take place in the years to come.

White pine blister rust remains a continual problem in California. Weather conditions for the past few years have not been conducive for rapid spread of the rust fungus and development on the alternate host, *Ribes* sp., and further spread of the pathogen south in the state was not recorded. However, infection of mature trees and mortality of sugar pine regeneration remained a problem.

No new exotic diseases were identified in the state in 2011. However, well established exotic diseases such as pitch canker, sudden oak death, and white pine blister rust continued to cause damage to the state's forest resources.

Fig 34: Declining big leaf maple along Highway 49 and the Yuba River.

Photo: W. Woodruff



Disease Conditions

Phytophthora Diseases

Sudden Oak Death
Phytophthora ramorum
Contributions by: Pete Angwin, Kamyar Aram, Kim Camilli, Phil Cannon, Ashley Hawkins, Erin Lovig, Jack Marshall, and Dave Rizzo


263A

Following two successive springs with adequate rainfall, many new symptomatic tanoaks became evident in the summer of 2011. Aerial surveys mapped almost 8,000 acres affected by sudden oak death (SOD) throughout California, an increase from 2010. The prominent change in sudden oak death occurrence in 2010 was the new find in Redwood Creek in Humboldt Co. (263A). University of California Cooperative Extension directs a suppression program which has removed or killed hundreds of tanoaks and bays.

California State Parks received American Recovery and Reinvestment Act (ARRA, federal stimulus dollars) funding to remove tanoaks and bays within two campgrounds: MacKerricher State Park's Pinewood Campground and Hendy Woods' Azalea and Wildcat Campgrounds (Mendocino Co., 263A). Tree removal was completed last year for MacKerricher, and this year's monitoring found one additional tree with stem cankers. State Parks personnel completed the second year of Agri-fos injections for 100 selected tanoaks.

This year over 200 tanoaks were felled at Hendy Woods. No Agri-fos treatments have been scheduled for the two campgrounds at this time.


261A

A stream-based detection survey was conducted in Monterey and San Luis Obispo Counties in central California (261A) for *Phytophthora ramorum*, the cause of sudden oak death. A total of 17 watercourse sites were surveyed between February and the beginning of June using rhododendron leaves as bait for *Phytophthora* species. These traps, containing 34 sets of baits, were put out and retrieved during each collection period. Bait leaves were cultured for the presence of *P. ramorum* at the University of California Davis.

Southern area sudden oak death monitoring was conducted for Southern Monterey and the entire San Luis Obispo and Del Norte Counties. The area was surveyed with a fixed-wing aircraft in May and July. Oak trees with red crowns indicating recent mortality were recorded onto a digital aerial sketch mapping system. Polygons were recorded during the aerial flights for later ground checks. The suspected trees were on private and Forest Service lands. Samples of suspicious symptoms were taken and sent to the lab for processing to determine presence of SOD.

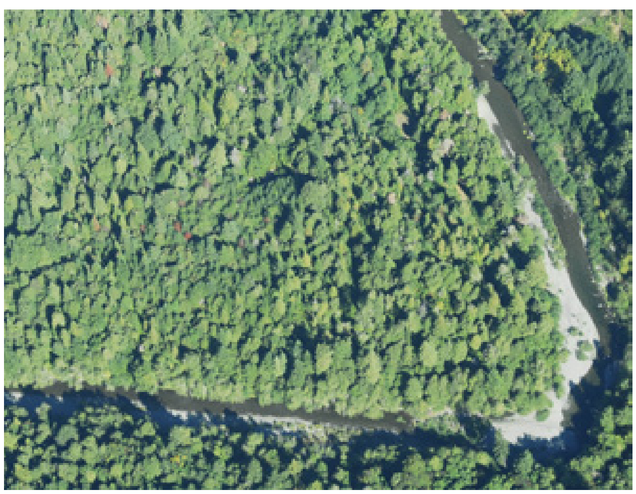
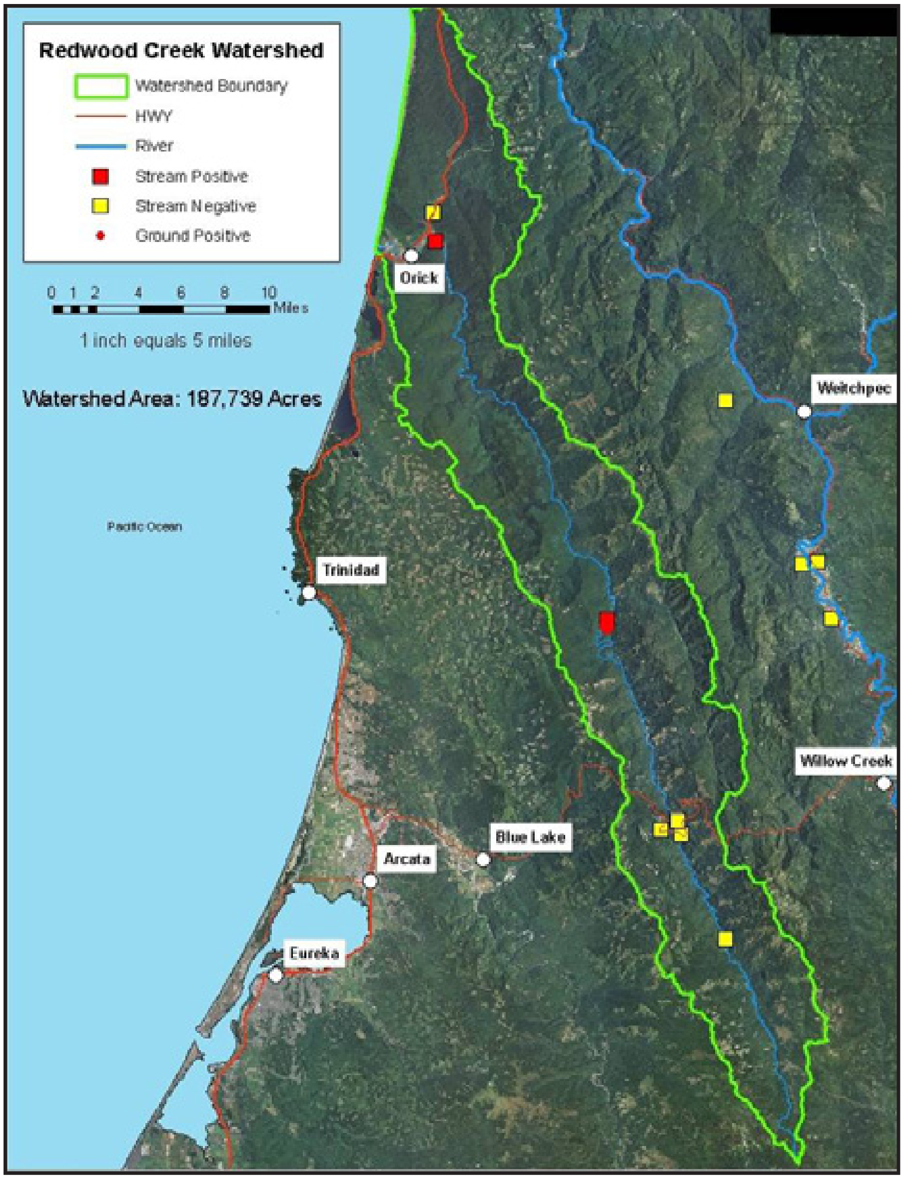


Fig 35: Tanoak mortality due to *Phytophthora ramorum* near Redwood Creek, Humboldt County.

Photo: P. Angwin

Redwood Creek Watershed

P. ramorum was found on a 20-30 acre patch of trees near Redwood Creek in northern Humboldt Co., California (263A). This new find was near the middle of a 1,000-square mile (640,000 acre) section of previously unaffected but vulnerable forest territory that stretches from the Van Duzen River, 20 miles south of Eureka, to the Oregon Border. Several landowners in the Redwood Creek Watershed were willing to collaborate on the effort to kill or remove



Map 3: The location of positive (red dots) and negative (yellow dots) stream-bait sites in the Redwood Creek watershed. The perimeter of this watershed is shown in green. The first indication that there could be *P. ramorum* in this watershed came from a single stream bait trap set up near Orick. Subsequent trapping at sites upriver have only been positive at one location in Redwood Valley.

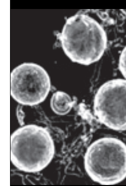
Map: University of California Cooperative Extension

infected trees within the infestation as well as susceptible trees within a buffer zone. Trees in more than half the area have already been treated. The landownership was divided between Green Diamond Timber Company, who had the primary objective of managing lands for commercial timber products, and approximately 12 residential use landowners in the Cookson Ranch area.

Between the infested area near Redway and the outbreak area in southwestern Oregon lies a stretch of 118 miles of high-risk California coast range which, until this year's wildland detection of *P. ramorum* in Redwood Valley, was considered to be uninfested. This was in spite of having approximately 1,000 square miles of uninterrupted forest filled with susceptible tree species running the entire length of this area. Risk maps for sudden oak death indicated that all tanoak in this area is at a high level of risk of becoming infected.

In 2010, the pathogen was detected in February stream baits set out in Redwood Creek near the town of Orick. Once confirmed, 15 additional stream bait traps were strategically set out along upstream locations of the Redwood Creek watershed and its tributaries. Also, in order to pinpoint the origin, road-based surveys collected numerous samples of symptomatic bay leaves throughout the watershed to determine if these might be infected with *P. ramorum*.

Two aerial flights were performed over the entire Redwood Creek area, which revealed a collection of dead tanoak on the west side of the Creek, near the residential subdivisions that are known as “Redwood Valley”. Soon after, the pathogen was discovered in Redwood Valley.



<u>2011 *P. ramorum* Stream Monitoring Results</u>
A total of 94 sites across 7 counties were baited between February and June in 2011. A summary of the results follows:

- Del Norte Co. – *P. ramorum* does not appear to be advancing into Del Norte Co. with all 9 monitored watercourses remaining negative.
- Humboldt Co. – The only new positive site in northern Humboldt Co. was along Widow White Creek (Central Ave., McKinleyville). This positive was a short distance upstream from the previous positive along Widow White Creek. Redwood Creek at Orick and Cookson Ranch remained positive for the second year. In central Humboldt Co. 2 new positive sites were found – Grizzly Creek, a tributary of the Van Duzen, and Larabee Creek, a tributary of the Eel River. While the Eel River had long been infested, the detection in Larabee Creek indicated the anticipated northward spread of the pathogen from terrestrial infestations at Eel Rock confirmed in 2008. The detection at Grizzly Creek marked the first detection of SOD along the Van Duzen. There were 4 new positive sites within the Mattole River watershed of southern Humboldt Co. (Mattole River at Ettersberg Bridge, Mattole River at Whitethorn, Mattole Canyon Creek and Crooked Prairie Creek) centered on Blue Slide Creek, a tributary of the Mattole River that had been positive since 2009. Previously, *P. ramorum* had only been recovered from Blue Slide Creek and its tributaries but it appeared to be expanding into the Mattole River itself.
- Mendocino Co. – In northern Mendocino Co., the South Fork of the Eel River at Piercy was positive in 2010 for the first time. The site represented the only positive site in the otherwise uninfested northwest corner of the county. However, in 2011 the site was negative for every deployment period. The Big River, which was positive for the first time in 2010, was positive for every deployment in 2011. The source of the positive was likely coming from the east as opposed to the north because tributaries to the north, the North Fork of the Big River and the Little North Fork of the Big River, were negative in 2011.
- Monterey Co. – There were no new positive watercourses in Monterey Co. Limekiln Creek, which was positive in 2006 and 2008 but negative in other years, remained negative in 2011. Redwood Gulch remained negative and Plaskett Creek remained positive.
- San Benito Co. – San Benito Co. was of concern because of its proximity to infested counties. The 2 monitored sites in Pinnacles National Monument along Chalone Creek remained negative in 2011.
- San Luis Obispo Co. – *P. ramorum* was apparently not advancing south into San Luis Obispo Co. as the 10 monitored sites remained negative.

<u>*Phytophthora ramorum* Nursery Update</u>
In 2011, California reported 13 positive nurseries for *P. ramorum* (http://www.cdfa.ca.gov/plant/pe/interiorExclusion/SuddenOakDeath/pdfs/2011PositiveNurseries.pdf). Three of the positive nurseries were in quarantined counties in the state. The rest of the positive nurseries were in non-quarantined counties. Work was ongoing to clean the nurseries of the disease.

M261A

Port-Orford-cedar Root Disease
Phytophthora lateralis
Contributions by: Pete Angwin and Don Owen

In the mid-1990’s, *Phytophthora lateralis* was introduced to Port-Orford-cedar at the intersection of the Bluff Creek Road (Forest Service Road 13N01) and Fish Lake Creek (Humboldt Co., M261A). Port-Orford-cedar root disease rapidly spread in Port-Orford-

Fig 36: Port-Orford-cedar seedling bait to detect *Phytophthora lateralis* at Scott Camp Creek eradication treatment area, Shasta-Trinity NF

Photo: P. Angwin

Fig 37: Aerial view of Scott Camp Creek Port-Orford-cedar eradication treatment area, Shasta-Trinity NF.

Photo: P. Angwin

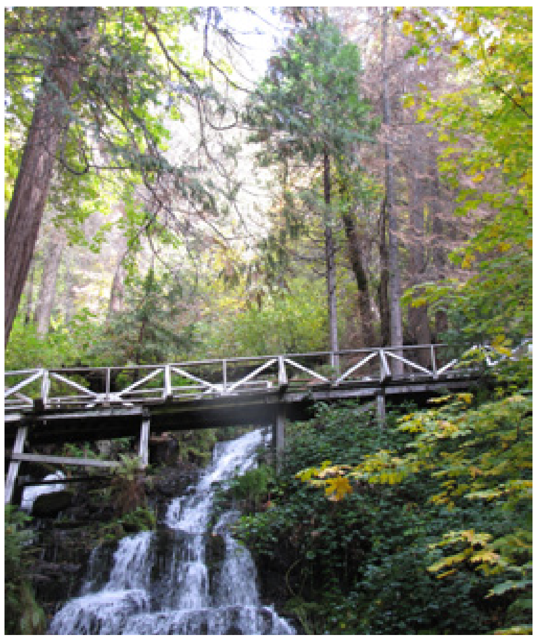


Fig 38: Dead and dying Port-Orford-cedar at the Saint Germaine Foundation property in Dunsmuir, CA.

Photo: P. Angwin

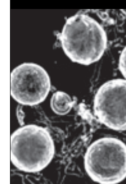
cedar along Fish Lake Creek to the south side of Fish Lake. In 2010, Port-Orford-cedar in a 5-acre patch on the north side of Fish Lake, adjacent to the west side of Fish Lake Campground began to die, indicating that the pathogen had been introduced (most likely by humans) to the opposite side of the lake. In 2011, the infestation on the west side of Fish Lake continued to spread and intensify.

In 2011, an infestation of Port-Orford-cedar root disease along Slide Creek, immediately above and below the crossing with the Bluff Creek Road (Forest Service Road 13N01), approximately 1-1/2-miles from the infestation at Fish Lake, continued to grow and intensify (Humboldt Co., M261A). Symptomatic Port-Orford-cedar were first noticed in 2007, and the presence of *P. lateralis* was confirmed in 2008.

M261A

Every year since 2008, genetic detection (PCR) tests have been performed to detect the presence of *P. lateralis* at the 3-acre eradication treatment at Scott Camp Creek in the upper Sacramento River drainage (Siskiyou Co., M261A).Tests conducted in 2011 failed to detect the pathogen. The pathogen has not been detected since 2008. Symptomatic or diseased Port-Orford-cedar have not been found outside the treatment area since the original infection was identified in 2001. All of the results to date indicate that the pathogen eradication treatment performed from 2003-2005 was successful.

In 2011, a new 10-acre infestation of Port-Orford-cedar root disease was confirmed at Shasta Springs, a tributary that flows into the Sacramento River on the Saint Germaine Foundation's property (formerly Shasta Springs Resort) in Dunsmuir (Siskiyou Co., M261A). Shasta Springs is a historically and ecologically significant site that contains one the largest concentrations of Port-Orford-cedar along the upper Sacramento River. Extensive mortality of Port-Orford-cedar occurred along the historic trail that runs from the resort on the canyon rim to the railroad right-of-way and river below. The trail was the likely avenue for the pathogen's introduction. A local group is advocating a new trail to access nearby Mossbrae Falls, a site which also had a large number of Port-Orford-cedar.



Phytophthora cinnamoni
Contribution by: Tom Smith

Coastal redwood trees planted off site in Sacramento Co. (262A) were dying from Phytophthora root disease. The trees formed a windbreak and visual barrier around a single property. The trees were approximately 20 years old and were suffering from the disease that was introduced by extensive watering of the plantings on the property.

262A

Canker Diseases

Douglas-Fir Canker
Diaporthe lokoyae or *Dermea pseudotsugae*
Contribution by: Pete Angwin

During the 2010 and 2011 aerial surveys, extensive Douglas-fir mortality was detected in low elevation drainages in the Klamath NF west of Yreka (Siskiyou Co., M261A). A follow-up ground survey revealed that these stands were affected by Douglas-fir cankers (either *Diaporthe lokoyae* or *Dermea pseudotsugae*) which are reported to be relatively common one to two years after drought. The 2006-2009 drought severely decreased tree vigor throughout northern California, but as of 2010, water conditions have returned to near normal. Douglas-fir twig beetles (*Pityophthorus pseudotseugae*) attacked cankered, stressed trees, which led to lethal attack by the flatheaded fir borer (*Melanophila drummondi*).

Fig 39: Douglas-fir mortality due to cankers, twig beetles and flatheaded fir borer west of Yreka, CA, Klamath NF.

Photo: P. Angwin

M261A

Stem Canker of Pines
Phomopsis sp.
Contribution by: Jack Marshall

A *Phomopsis* species was isolated from lower stem cankers of Bishop pine and shore pine seedlings from Little River drainage in Mendocino Co. (263A).

Fig 40: Coalescing, sporulating cankers of *Seiridium cardinale* on young Leyland Cypress,

Photo: P. Zambino

263A

Seiridium Canker
Seiridium sp.
Contributions by: Jack Marshall and Paul Zambino

A *Seiridium* species was isolated from branch cankers on giant sequoia in Jellystone Park in Lake Co (M261B). Only one tree was infected, with three adjacent trees showing no symptoms. The infected tree was the only one within a lawn setting, and was presumed to be receiving water via sprinklers.

Seiridium canker, *Seiridium cardinale*, caused either rapid branch dieback, fast-growing stem cankers, or mortality of about 45 planted Leyland

Fig 41: Rapid spread of Seiridium canker causing mortality in Leyland Cypress in southern California.

Photo: P. Zambino

M261B

cypress ranging from 6-8” DBH at a historic ranch site on Lytle Creek road between the town of Lytle Creek and the Lytle Creek Ranger Station, Front Country Ranger District, San Bernardino NF (San Bernardino Co., M262B). Every Leyland cypress appeared affected, whereas incense cedars did not.

M262B

Botryosphaeria Canker of Coast Redwood
Botryosphaeria sp.
Contribution by: Tom Smith

262A

Coastal redwood trees planted off site in the Central Valley in Sacramento Co. (262A) exhibited limb dieback from Botryosphaeria canker. The trees were under stress from heat and over watering of the site. Dieback was common on the lower branches of the trees. Several dozen trees were impacted by the disease.

Cytospora Canker
Cytospora abietis
Contributions by: Leif Mortenson and Brent Oblinger

Cytospora canker occurrence remained widespread, with no signs of lessening in the red fir distribution zone throughout the Sierra Nevada and northwestern California, and in white fir forests throughout the state. There continues to be an exceptionally strong association between red fir dwarf mistletoe and Cytospora canker. Because greater than 20% of red fir trees statewide contain dwarf mistletoe infection, levels of Cytospora canker are also high.

Fig 42: Severe branch flagging on red fir due to dwarf mistletoe and Cytospora canker, Grizzly Meadows, Trinity Alps Wilderness, Shasta-Trinity NF.

Photo: B. Oblinger

Severe branch flagging due to Cytospora canker and dwarf mistletoe continued on mature red fir in the Grizzly Meadows area of the Trinity Alps Wilderness, Shasta-Trinity NF (Trinity Co., M261A). Crown dieback on some trees exceeded 50% just below Grizzly Lake. Branches previously killed by this disease, without foliage attached, also still remained in the crowns. Dieback will likely continue throughout this area in the future due to high inoculum levels of both dwarf mistletoe and *Cytospora abietis*.

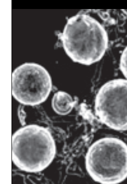
M261A

Pitch Canker
Fusarium circinatum
Contributions by: Jack Marshall and Tom Gordon

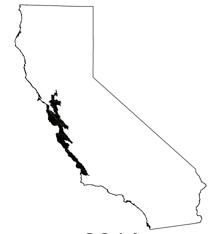
263A

Pitch canker continued to spread and intensify in and adjacent to the Point Reyes National Seashore area in western Marin Co. (263A). Both Bishop pine and non-native Monterey pine were infected. Severely infected trees were being killed by pine engraver beetles.

Thirty seven plots in native stands of Monterey pine that were established in 1996 were surveyed in the fall of 2010. Mean severity of pitch canker (caused by *Fusarium circinatum*) across all plots was 23.8% (of the maximum possible), which was nearly identical to what was recorded in 2008 (24.1%). This was consistent with other evidence indicating that induced resistance is operative in native stands of Monterey pine and is constraining disease development. Survey results also showed that pitch canker was significantly more severe near the coast than farther inland, a trend that has been apparent since 1996. Seventeen coastal plots had a mean rating of 32% (of the maximum possible), as compared to 14% for 20 inland plots. Elsewhere, pitch canker remained evident in planted Monterey pines in



coastal California, from San Diego Co. (261A) in the south through Sonoma Co. (263A) in the north. In most areas where the disease had been present for many years, it was less conspicuous than it had been historically. In some locations (e.g., New Brighton State Beach and Sunset State Beach in Santa Cruz Co., 261A) inoculations confirmed that asymptomatic trees once severely diseased were becoming resistant to pitch canker. During spring and summer of 2011, sixteen monitoring plots were established at Pt. Reyes National Seashore, in native stands of Bishop pine regenerating after the Mt. Vision fire in 1995. Half of the plots were located in relatively open areas and the other half in dense stands. The initial ratings revealed a higher incidence of disease in open-area plots (10-95% of trees had at least one infection), than in plots within dense stands (0-17%). Presently, pitch canker appears to have remained limited to coastal California. The most inland location known to have an active infestation is a Christmas tree farm in Solano Co. (262A). There was no evidence of a recurrence at the site in El Dorado Co., where pitch canker was discovered affecting Douglas-fir in 2003. Likewise there was no indication of a northward expansion of the infestation beyond Sonoma Co.



261A

262A

Canker Rot of Blue Oak
Inonotus sp.
Contribution by: Don Owen

A high incidence of canker rot was present on approximately 20 acres of blue oak growing on a ridgetop near Cottonwood Creek, Tehama Co. (M261C). Within this area, roughly 40% of trees exhibited some degree of infection, presumably by an *Inonotus* sp. A handful of trees appeared to have been killed by the infections. It was unknown why the disease was concentrated in the area.

M261C

Bot Cankers of Oaks
Botryosphaeria sp.
Contribution by: Paul Zambino

Bot canker fungi caused ongoing significant dieback in large coast live oaks at the Wilderness Gardens Preserve, Hwy 76, Pala (San Diego Co., M262B). Cumulative mortality over recent years in some areas was about 40%. Dead and cankered trees were outside the current range of the goldspotted oak borer, *Agrilus auroguttatus*.

M262B

Charcoal Canker of Oak
Biscogniauxia mediterranea
Contribution by: Paul Zambino

Charcoal canker caused ongoing decline in fire-affected canyon live oaks in the upper San Gabriel River Valley in the vicinity of Crystal Lake Campground on the San Gabriel River Ranger District, Angeles NF, (Los Angeles Co., M262B). Trees with even slight fire exposure to the 2002 Curve Fire had significant decline in 2011. Fresh strips of the thin, black, spore-producing stromata that give this disease its name were abundant.

Fig 43: Increasing canyon live oak mortality caused by charcoal canker continues to pose hazards in the Angeles NF nine years after fire.

Photo: P. Zambino

Incidence of charcoal canker was near 100% in 80 trees in five acres of slopes to the west of road 3N09.2 west of West Pine Flat and also on slopes west of the Canyon Oak picnic area, but was lower among the widely-spaced trees on 10 acres of flat ground within the Canyon Oak picnic area itself. Most affected open-spaced canyon live oaks in the latter area produced abundant root sprouts near

affected boles. On the slopes, failure was observed in many trees at the lower boles because of decay associated with this disease. Mortality and failure will likely continue in all affected areas. Trees that developed thin callus ridges at the edges of cankers may persist for longer periods, and become a longer-term hazard tree problem.

Rust Diseases

M261E

White Pine Blister Rust

Cronartium ribicola

Contributions by: Joan Dunlap, Patricia Maloney, and Brent Oblinger

White pine blister rust remained a continual problem in California. Weather conditions for the past few years were not conducive for rapid spread of the rust fungus and development on the alternate host, *Ribes* sp., and further spread of the pathogen south in the state was not recorded. However infection of mature trees and mortality of sugar pine regeneration remained a problem.

Fig 44: Topkill due to white pine blister rust on western white pine near Tragedy Spring, Eldorado NF.

Photo: B. Oblinger

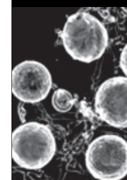
Severe, recent topkill and mortality of western white pine was observed in the Tragedy Spring area and surrounding Beauty Lake on the Eldorado NF (M261E). All pole-sized trees had severe topkill. Severity of recent topkill on larger diameter trees in the overstory varied, but evidence of previous topkill was widespread. Favorable conditions for further disease development (due to available moisture in 2010 and 2011) will likely result in additional damage at these locations in the future.

<u>High Elevation Blister Rust Surveys</u>

From 2004 to 2006, a California-wide survey was conducted to evaluate the incidence and distribution of *Cronartium ribicola*, the cause of white pine blister rust (WPBR), in the high elevation white pine forests. White pine blister rust occurrence varied considerably within and between regions, and little to no disease was found in the Basin and Range, eastern Sierra Nevada, and Transverse and Peninsular mountain ranges. Field surveys revealed no evidence of rust on Great Basin bristlecone, limber, or the southern subspecies of foxtail pine. Rust incidence for western white pine was highest in the North Coast region (42% of trees surveyed), followed by the Klamath (18%) and northern Sierra Nevada (14%). For whitebark pine, WPBR incidence averaged 24% in the northern Sierra Nevada; this was considerably greater than other regions where whitebark pine was found infected. A further survey for incidence of the disease is planned for the spring in 2012.

<u>2011 White Pine Blister Rust Resistance Program</u>

The Region 5 Genetic Resources staff has a program of screening primarily sugar pine (*Pinus lambertiana*) for natural genetic resistance to white pine blister rust (*Cronartium ribicola*). Screening for major gene resistance (MGR) occurs at the Placerville Nursery, Eldorado NF, (M261E) and for slow rust resistance (SRR) at two field sites on the Happy Camp Ranger District, Klamath NF (M261A). In the winter of 2011, 387 sugar pine and 130 western white pine families were screened for major gene resistance; 19 sugar and 4 western white pine families had MGR. On Federal lands, 14 out of 276 sugar pine families, all from central and northern California forests, had major gene resistance. In Winter of 2012, rust-resistance screening will include about 452 sugar pine families from the northern to southern California national forests and private industry lands. In addition, resistance will be examined in 98



families of western white pine originating from two national forests. To date, a total of 1,807 MGR sugar pines have been identified on federal, state and private lands.

On the Klamath NF, activities related to slow rust evaluations continue with the planting of 760 MGR sugar pines from 158 families and 72 MGR western white pines from 4 families at the Happy Camp Outplanting (HCOPS) field site and 3,487 untested seedlings from 143 North Zone non-MGR sugar pine families at the Happy Camp Classic field site, all grown at the Placerville Nursery. This year, evaluations at the HCOPS led to the selection of 32 new sugar pines with SRR traits from 565 surviving trees (out of 4,177 trees planted in 1993 and 2003). In addition, the second rust reading of 7,650 sugar pines planted in the 2006 SRR heritability study was completed in Spring 2011. These data will provide early insight into the heritability of slow rust resistance mechanisms in sugar pine. As of June 2011, the fast-rusting susceptible control family was 100% infected with 49% mortality from rust. The top slow rust resistance family was showing 46% clean trees, 35% effective slow-rusting trees, and no mortality. The slow-rust resistant families show excellent resistance and tolerance to the virulent strain of *Cronartium ribicola* (**vcr1**) at Happy Camp. Since that time, mortality has been continuing and data from September 2011 are confirming trends of less mortality and more slow rust traits in progeny with slow rust resistant parents. These preliminary data are confirming the usefulness of SRR with MGR in Region 5's Rust Resistance Program and is congruent with the genetic approach to slow rust resistance for western white pine in other regional programs.

	Region						
Species	**North Coast**	**Klamath**	**Southern Cascade**	**Northern Sierra Nevada**	**Southern Sierra Nevada**	**Great Basin**	**Transverse & Peninsular Ranges**
Pinus albicaulis							
n	N/P	3	3	23	17	3	N/P
mean	-	1.2	1.3	24.2	0.5	0	-
range	-	0-4	0-4	0-76	0-4	0	-
P. balfouriana							
n	N/P	6	N/P	N/P	6	N/P	N/P
mean	-	12.2	-	-	0	-	-
range	-	0-32	-	-	0	-	-
P. flexilis							
n	N/P	N/P	N/P	0	6	4	4
mean	-	-	-	-	0	0	0
range	-	-	-	-	0	0	0
P. longaeva							
n	N/P	N/P	N/P	N/P	N/P	5	N/P
mean	-	-	-	-	-	0	-
range	-	-	-	-	-	0	-
P. monticola							
n	4	4	3	20	10	2	N/P
mean	42.0	18.0	0.7	14.0	8.1	0	-
range	24-74	0-72	0-2	0-90	0-42	0	-

Table 3: High elevation white pine blister rust survey summary, mean incidence and range, for each species by region (*n* = number of survey plots/region) and N/P denotes species not present in region. The Great Basin region includes the Warner, White, Inyo, and Panamint mountains. *Pinus albicaluis* = whitebark pine; *P. balfouriana* = foxtail pine, *P. flexilis* = limber pine; *P. longaeva* = Great Basin bristlecone pine; *P. monticola* = western white pine.

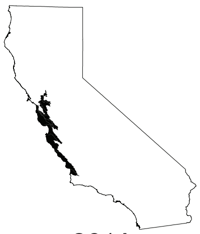
This year's cone crop on sugar pine was moderate in the Sierra and northern California forests but extremely light in southern California, so the Regional Genetics group coordinated cone collection efforts primarily in the first two areas with contractors or cooperators. The Placerville Nursery received about 397 bushels from 100 rust-resistant sugar pines in the Sierra and northern forests. Collections were also made from 42 foxtail, limber, and whitebark pines using funds from State and Private Forestry, Forest Health Protection. The collections were from five national forests, Yosemite NP, and the Santa Rosa Indian Reservation. Future

Fig 45: Western gall rust on knobcone pine.

Photo: K. Camilli

collections are expected from other sites as part of a three-year contract to gather seed from new areas for seed banking as genetic conservation collections.

Western Gall Rust
Endocronartium harknessii = Peridermium harknessii
Contributions by: Kim Camilli and Tom Smith



261A

Knobcone pines on the east side of Cuesta Grade in San Luis Obispo Co. (261A) were infected with Western Gall Rust. Trees exhibited branch dieback as well as yellowing and reddening of the crown at the point above the infected area. Infected trees generally had light to moderate infections and did not appear to be declining. Infections were seen along a seven mile stretch of East Cuesta Road off of highway 101N.

M261F

Scattered large diameter ponderosa pines throughout the foothills of the Sierra Nevada in a band from Amador to Nevada Counties (M261F) were infected with western gall rust. The trees exhibited extensive dieback of branches and foliage beyond the points of infection. Entire trees were turning brown from the disease but no mortality occurred. Symptoms were most significant where the trees were suffering from other stresses such as root compaction in yard areas or exhaust pollution and compaction along roads and highways. All impacted trees showed significant gall development.

Rust of Myrtaceae (guava, eucalyptus, common myrtle, paperbark, etc.)
Puccinia psidii
Contributions by: Pat Nolan and Paul Zambino

M262B

Infections by *Puccinia psidii* were detected on paperbark (tea tree) during a regular inspection of a San Diego, California (San Diego Co., M262B) nursery in November 2010 by San Diego Co. inspectors. This detection was published as a first report on this host for the state. The rust has only occasionally been seen in California since its first detection here in 2003, and always in nursery settings. In many other parts of the world, recent introductions of this rust species caused severe damage in both native and commercially important, introduced plants of the Myrtaceae. Though severe in Eucalyptus plantations in South America and Uruguay, rose apple and ohi'a in Hawai'i, and paperbark and guava in Florida, this rust disease is still rare in California, and had never been detected on Eucalyptus.

The rust sample was sent to researchers at the USFS Rocky Mountain Research Station for DNA studies of the rust's diversity to determine the history of its worldwide spread.

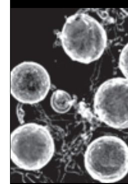
Shoot and Foliar Diseases

Diplodia Shoot Blight
Diplodia sp.
Contributions by: Don Owen

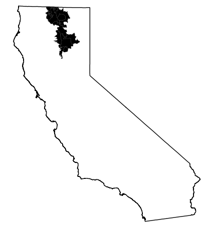
M261A

Two consecutive years of wet spring weather contributed to a high incidence of Diplodia blight in the upper Sacramento River canyon in 2010 (M261A). Despite another wet spring this year, there has been a decrease in the amount of branch flagging caused by *Diplodia* sp. This was especially true in the upper canyon around Castella and Dunsmuir, where

many trees exhibited evidence of numerous old infections, but few if any new infections. In the lower canyon, individual, widely scattered trees had new infections, but the amount of disease overall was less. The likely cause of the decrease was the cooler than normal spring weather and a corresponding delay in bud break and shoot development on ponderosa pine. Temperatures across north central California were about 3.5°F cooler than normal during May and June.



Elytroderma Needle Disease
Elytroderma deformans
Contributions by: Don Owen and Paul Zambino



M261D

Elytroderma disease caused needle flagging on ponderosa pine this spring across a couple thousand acres of private forestland on the southwest side of Cornaz Lake (Shasta Co., M261D), at 4600-4800' elevation. Most flagging occurred on widely scattered, older trees with systemic infections.

M262B

Elytroderma needle infection in pines was much more apparent across the San Bernardino NF in southern California (M262B) in 2011 than in the previous several years. Elytroderma was confirmed by the developing linear stromata (immature hysterothecia) among the abundant brown-tipped needles at some locations. At Barton Flat Campground, Mountaintop Ranger District, understory Jeffrey pine, up to 12" DBH situated near mature trees with well-developed brooms had abundant needle infections. At Bear Mountain, along 2N12, also on the Mountain Top District, about 35% of mature Jeffrey pine in a mature mixed conifer stand had evidence of significant Elytroderma brooms and current year needle symptoms. But more isolated trees were also infected: There was a 31" DBH Jeffrey pine with needle symptoms at the Vivian Creek trailhead near Forest Falls, Front Country Ranger District. Also, needle symptoms were confirmed in a lone Coulter pine, at a historic ranch site on Lytle Creek road between the town of Lytle Creek and the Lytle Creek Ranger Station, Front Country Ranger District.

Redwood Tip Dieback
Botrytis sp.
Contribution by: Jack Marshall

263A

Tip dieback of redwood, of both leaders and branches, was observed in the Arcata Community Forest following wet springs in both 2010 and 2011 (Humboldt Co., 263A). Dieback was widespread throughout the forest and was most often observed on saplings. Samples submitted to the UC Berkeley Forest Pathology and Mycology Laboratory were DNA sequenced and *Botrytis* sp. detected.

Sugar Pine Needle Cast
Lophodermella arcuata
Contribution by: Danny Cluck

M261E

Sugar pine needle cast was observed on about 10 large diameter sugar pines (>20" DBH) within the Wyandotte Campground at Little Grass Valley Reservoir, Plumas NF (Plumas Co., M261E). The browning of needles on infected trees created some concern that they were dying and that critical bald eagle roosting sites would be lost. Similar injury has been reported in this general area before with no subsequent mortality.

True Fir Needle Cast
Lirula abietis-concoloris
Contribution by: Tom Smith

White firs in a Christmas tree plantation in the Nevada City area (Nevada Co., M261E), were infected with true fir needle cast disease. Much of the foliage of the trees had died back. So many needles died from the disease that the trees were unlikely to be sold during the holiday season. However, no mortality occurred.

Anthracnose on Oak and Sycamore

<u>Sycamore Anthracnose</u> - *Apiognomonia veneta (Discula platani)*
Contributions by: Kim Camilli, Tom Smith, and Paul Zambino

M262A

2011 aerial survey data and ground surveys reported sycamore trees along riparian areas being completely defoliated in San Francisco, San Mateo, Santa Cruz, Monterey and San Luis Obispo Counties (261A, M262A) by sycamore anthracnose. Wet and windy conditions prevailed during the spring which was conducive to sporulation by the fungus. Spores infected new leaves and small twigs in the crowns of the trees. Most healthy trees recovered from the infections although stressed trees with thin crowns and dieback recovered slowly. The situation was a typical reaction for stressed trees under successive years of infection.

Fig 46: Sycamore leaves infected with Anthracnose in San Luis Obispo Co.

Photo: K. Camilli

M262B

Sycamore anthracnose was prevalent again in 2011 in California sycamore throughout San Bernardino Co. (M262B), both in plantings of boulevard trees in San Bernardino and Redlands, and in natural areas where it had been reported as severe in 2010 (main and side canyons along City Creek, Mill Creek, and Little Sand Canyon, Front Country Ranger District, San Bernardino NF). Almost all trees were affected to some degree. The unusually long, wet spring season and moist air flow within valleys was presumed to account for severity. Also, California sycamore trees had severe leaf anthracnose and twig dieback from anthracnose disease near the Walker Basin area in Kern Co. (M261F). All of the sycamores in the area exhibited severe anthracnose of the leaves that had spread into the twigs causing branch dieback; no mortality was reported.

M261F

Severe oak anthracnose was noted on California black oak trees covering a region from Amador to Sierra Counties at around 1,000-2,500' elevation (M261F). The foliar disease began as small spots on the leaves that resembled insect feeding damage but eventually expanded to more typical anthracnose symptoms. All black oaks within the region were affected with many trees appearing copper colored from the disease early in the summer. The disease was likely related to the late spring and early summer rainfall experienced throughout the area.

Foliar Blight of Madrone

Mycosphaerella sp. & *Monochaetia* sp.
Contribution by: Jack Marshall

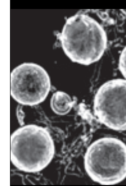
263A

Madrones in Napa, Sonoma, Mendocino, and Humboldt Counties (263A) continued to have spring reports of severe foliar blight. Sampling the past two years has yielded both fungal species from similarly symptomatic trees. Wet springs continued to favor local outbreaks.

Dogwood Anthracnose

Discula destructiva
Contribution by: Jack Marshall

Dogwoods in Redwood Valley (Humboldt Co., 263A) were found infected with *D. destructiva* late in the summer.



Maple Leaf Scorch
(possibly caused by *Xylella fastidiosa)*
Contributions by: Danny Cluck and Bill Woodruff

Maple leaf scorch (MLS) may have been first reported in California as a “blight” of bigleaf maple “*from central Oregon to Yosemite National Park*” in *Forest Pest Conditions in California-1964*. Since this first report, MLS was reported in at least 20 subsequent editions of the “California Conditions Report” to be present throughout much of northern California. The reports attributed MLS to a combination of suspected causes such as desiccation, xylem-sucking insects, and/or bacteria spread by those insects.

Fig 47: Dying big leaf maple along Yuba River.

Photo: B. Woodruff

In 1998, MLS was obvious along Indian Creek, Feather River, and Yuba Rivers in Plumas and Sierra Counties (M261E). From 1998 to 2008, the MLS in these drainages was informally monitored and MLS continued to reoccur, suggesting that the cause was biotic and not weather-caused, as reported in 1998. Although no data was recorded from the observations, MLS appears to have intensified over the decade as the affected trees continued to decline and in some cases experienced up to 100% crown dieback. Typical symptoms included browning of the leaf margins, drastically reduced leaf size and branch and stem dieback.

Fig 48: Maple leaf scorch causing branch and stem dieback of mature big leaf maple, Gansner Bar Campground, Plumas NF.

Photo: D. Cluck

In July 2008, samples of leaves and branches from bigleaf maple trees were collected along Highways 49 and 89 in Sierra and Plumas Counties, respectively. The samples were sent to Rutgers University, New Jersey, for analysis. An enzyme-linked immunosorbent assay (ELISA) for *Xylella fastidiosa*, a suspected cause of bacterial leaf scorch (BLS), was run and found positive. In 2009 and 2011, more samples were sent to Xylella labs at Rutgers, University of California Davis, and University of California Riverside to identify the strain(s) of *X. fastidiosa* present. To date, the strain has yet to be determined. In August 2011, the study of MLS was expanded to Oregon and Washington as a result of collaboration with California.

Fig 49: Big leaf maple leaf with maple leaf scorch, Indian Creek, Plumas NF.

Photo: B. Woodruff

Bacterial Leaf Scorch is an infectious chronic disease caused by the fastidious, gram-negative, xylem-limited bacterium *X. fastidiosa*. This bacterium, which is transmitted by xylem-feeding insects, colonizes and physically “clogs” the tree’s water conducting (xylem) tissues. Water transport becomes disrupted in roots, branches, and leaves due to large amounts of multiplying bacteria and their by-products. The presence of the bacteria

M261E

also triggers a reaction in the tree that plugs the xylem, further impeding water transport and eventually killing the tree. *X. fastidiosa* occurs in California in a number of hosts, but further research is needed to determine if it contributes to MLS of bigleaf maple.

Maple leaf scorch was present in the same locations in 2011 as reported in previous years (state highways and county roads along Indian Creek, Meadow Valley, Berry Creek, and the Feather River Canyon in Plumas Co., Deer Creek in Butte Co., and the North Yuba River in Sierra Co., M261E). Maple leaf scorch was negatively impacting the Gansner Bar Campground, Plumas NF, Plumas Co., where it was slowly killing mature big leaf maples next to campsites.

Root Diseases

Heterobasidion Root Disease
Heterobasidion irregulare
Contributions by: Pete Angwin, Phil Cannon, Jack Marshall, and Brent Oblinger

M261D

Although the drought conditions of 2006-2009 have largely abated, the McCloud Flats area of the Shasta-McCloud Management Unit, Shasta-Trinity NF, Siskiyou Co. (M261D) continued to have extensive ponderosa pine mortality due to overstocking and the combined effects of Heterobasidion root disease (*Heterobasidion irregulare*), black stain root disease, and western pine beetle. In 2011, the Pilgrim Creek area on McCloud Flats had extensive ponderosa pine mortality across nearly 7,000 acres, with 2-30 trees per acre being affected.

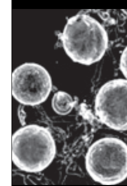
M261B

Conks of *H. irregulare* were found in association with flathead borers in the death of two large sugar pines on Boggs Mountain Demonstration State Forest (Lake Co., M261B).

Mortality of large diameter and pole-sized ponderosa pine was detected near the intersection of Indigo Way and Foxfire Way outside Nevada City on the Tahoe NF (Nevada Co., M261E) during an aerial survey conducted by the US Forest Service in 2010. A site visit in 2011 confirmed the presence of *Heterobasidion irregulare* conks in old pine stumps. A disease center was then found where old mortality was observed closer to the center and trees recently killed were further from the center.

Fig 50 Ponderosa pine mortality at McCloud Flats (Shasta-Trinity NF) due to the combined effects of drought, Heterobasidion root disease, black stain root disease and western pine beetle.

Photo: P. Angwin



Heterobasidion occidentale
Contributions by: Pete Angwin, Leif Mortenson, and Brent Oblinger

There remains a strong statewide correlation between true fir stands with management (cutting) history and the presence of Heterobasidion root disease. Statewide observation suggests that other tree stressors (especially red fir dwarf mistletoe with its associated Cytospora canker) may need to be present in order for Heterobasidion root disease-related mortality to reach high levels.

Fig 51: *Heterobasidion occidentale* fruiting bodies from an infected white fir stump at the Sugar Springs Campground, Mendocino NF.

Photo: P. Angwin

Fruiting bodies of *Heterobasidion occidentale* were found in two white fir stumps in Sugar Springs Campground on the Grindstone Ranger District of the Mendocino NF (Tehama Co., M261B). Fruiting bodies were also found in two white fir stumps immediately outside of the campground, along with three stumps with laminate decay.

M261B

Heterobasidion root disease was observed on dead trees in numerous locations in coastal Humboldt Co. (263A). Fruiting bodies of *H. occidentale* were collected from dead western hemlock in the middle Redwood Creek watershed, from dead shore pine and grand fir in McKinleyville, and from dead Sitka spruce in the Arcata Community Forest. The fungus was likely infecting living trees in the grand fir location, where fir engraver beetle activity was also evident.

263A

Mortality of pole- and sawtimber-sized white fir was found throughout a drainage east of Stampede Reservoir northwest of Ladybug Peak on the Tahoe NF (M261E). Both root disease and fir engraver contributed to mortality in the area. This stand was thinned over 5 years ago where decayed white and red fir stumps were present. Large *H. occidentale* conks were present in numerous stumps throughout the stand. Mortality of true fir will likely continue and root disease will remain a problem at this site.

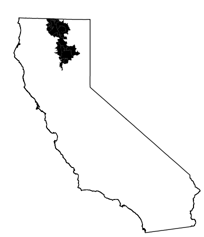
M261E

Armillaria Root Disease
Armillaria sp.
Contribution by: Phil Cannon, Jack Marshall, Brent Oblinger, Don Owen, and Paul Zambino

Up to 60 young (4-5ft tall) ponderosa pines were dead or dying in a low elevation plantation east of Manton, near the intersection of Ponderosa Way and Rock Creek Rd (Shasta Co., M261D). A sample of dying trees showed that all had L-shaped roots from poor planting, all were currently infested by pine reproduction weevil, and a subset had Armillaria root infection, probably *A. mellea*. Trees with only weevil infestation were scattered across the plantation, whereas the root diseased trees (about 20) were more or less grouped together. Some of the diseased trees exhibited a distinct resinous reaction in response to the infection, indicating they were alive when infected. Although it was not obvious, it was suspected that reservoirs of *Armillaria* sp. were present in the soil on buried woody material.

Fig 52: Rhizomorphs of an *Armillaria* sp. in the root system of a madrone.

Photo: B. Oblinger



M261D

A few Douglas-fir trees were killed by Armillaria above Redwood Creek in Redwood Valley

263A

(Humboldt Co., 263A). Flatheaded fir borer also killed three large, root diseased Douglas-fir in Boggs Mountain Demonstration State Forest in Lake Co. (M261B)

Armillaria root disease caused failure of a mature 30” Jeffrey pine, *Pinus jeffreyi*, at Jenks Lake Recreational Area just west of Jenks Lake, Mountain Top Ranger District, San Bernardino NF (San Bernardino Co., M262B). Three infection centers were also detected in a plantation of young mixed Coulter and knobcone pine, adjacent to the Lytle Creek Ranger Station, Lytle Creek Road, Front Country Ranger District, San Bernardino NF. Each was found by mycelial fans and rhizomorphs in a dead sapling of less than 8’ height. Both sites were subject to periodic water saturation that favored the disease. Armillaria also killed and toppled a mature Jeffrey pine within several feet of the Ponderosa Vista Nature Trail west of the junction of California Hwy 38 and Jenks Lake Road West, Mountain Top Ranger District, San Bernardino NF. This tree was adjacent to a fire-damaged oak colonized with Armillaria rhizomorphs.

M261B

Mortality and dieback of madrone was observed within the Empire Mine State Park in Grass Valley (Nevada Co., M261E) during previous aerial surveys conducted by the US Forest Service. During a site visit in July of 2011, Armillaria root disease was found within the stand. *Armillaria gallica* was confirmed in one tree using PCR, but further studies are needed to determine which species are causing root disease. Shoot blight due to an unknown pathogen and foliar diseases, such as tar spot, were also extensive throughout this stand.

M262B

Black Stain Root Disease
Leptographium wageneri
Contributions by: Pete Angwin and Jack Marshall

Although the drought conditions of 2006-2009 had largely abated, the McCloud Flats area of the Shasta-McCloud Management Unit, Shasta-Trinity NF, Siskiyou Co. (M261D) continued to have extensive ponderosa pine mortality due to overstocking and the combined effects of black stain root disease, Heterobasidion root disease, and western pine beetle. In 2011, the Pilgrim Creek area on McCloud Flats had extensive ponderosa pine mortality across nearly 7,000 acres, with 2-30 trees per acre being affected.

M261E

Conspicuous concentrations of mortality around black stain root disease centers have been evident in ponderosa pine at the Mud Flow Research Natural Area of the Shasta-McCloud Management Unit of the Shasta-Trinity NF (Siskiyou Co., M261D) for many years. While a windstorm during the winter of 2008-2009 blew down large numbers of the root-diseased pines, mortality continued in 2011.

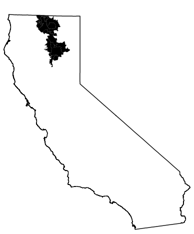
Dead or dying Douglas-firs with black stain root disease were observed in several places in Humboldt Co. (263A), including Redwood Valley. A few small Douglas-firs were infected near Parlin Fork of Jackson Demonstration State Forest. One pole-sized Douglas-fir was dying near Calso Camp on Boggs Mountain Demonstration State Forest. All other known black stain root disease sites mapped on Boggs since the early 1990’s were revisited, but no further symptomatic trees were found.

Fig 53: Laminant decay with copious amounts of setal hyphae from Douglas-fir with laminated root rot near Titlow Hill, Six Rivers NF.

Photo: P. Angwin

Laminated Root Rot
Phellinus weirii
Contribution by: Pete Angwin

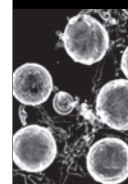
An old-growth mixed conifer stand with laminated root rot in Douglas-fir and white fir was identified and documented near Titlow Hill,



M261D

approximately five miles south of California State Highway 299 and eight miles southwest of Willow Creek, on the Lower Trinity Ranger District of the Six Rivers NF (Humboldt Co., M261A). The root disease centers were scattered over an area of approximately 20 acres. This is the most southerly known occurrence of the pathogen.

M261A



Schweinitzii Root Disease
Phaeolus schweinitzii
Contribution by: Jack Marshall

Phaeolus schweinitzii conks were found beneath several shore pines on Jackson Demonstration State Forest near CALFIRE's Woodlands Station (Mendocino Co., 263A).

Root diseased Douglas-fir trees were eventually killed by Douglas-fir beetle and flatheaded fir borers near Van Arsdale in Mendocino Co. (263A).

Phaeolus schweinitzii conks were also found on several Douglas-fir stumps in the area of the new sudden oak death site in Redwood Creek drainage in Humboldt Co. (263A).

263A

Ganoderma root and butt rot
Ganoderma resinaceum
Contribution by: Paul Zambino

Ganoderma root and butt rot was abundant in coast live oak growing along nine blocks of parkway median of Brookside Avenue, Redlands, San Bernardino Co. (M262B). About 5% of oaks 12-36" diameter were recently killed due to this ongoing problem and other trees had apparently died and been replaced with 2" DBH oak saplings in previous years. Damage from lawn maintenance and heavy irrigation likely contributed to the problem; mechanical damage at the bases of trees had often girdled more than 30% of the root crown. Fresh annual conks of *G. resinaceum* were present on about a tenth of 40 trees checked, and occurred on both declining and healthy-appearing trees that had mechanical damage.

Fig 54: *Ganoderma resinaceum* conk growing on a coast live oak, Redlands, CA.

Photo: P. Zambino

M262B

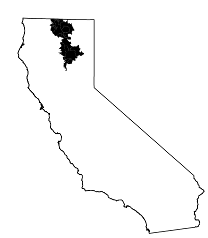
Mistletoes

Limber Pine Dwarf Mistletoe
Arceuthobium cyanocarpum
Contribution by: Pete Angwin

Mortality of whitebark pine continued in an approximately 80 acre area on Bolam Bench on the northern flank of Mt. Shasta, Shasta-Trinity NF, Siskiyou Co. (M261D). Mortality was due to mountain pine beetle in whitebark pine that was heavily infected with limber pine dwarf mistletoe. This infestation was previously reported as a "ghost forest" by Cook in 1955 and was later surveyed by Mathiasen and Hawksworth in 1988.

Fig 55: Whitebark pine mortality on Mount Shasta, shasta-Trinity NF, caused by mountain pine beetle in association with limber pine dwarf mistletoe and drought.

Photo: P. Angwin



M261D

263A

Dwarf Mistletoe of Western Hemlock

Arceuthobium tsugense subsp. *Tsugense*
Contribution by: Chris Lee

Dwarf mistletoe in western hemlock was observed to be widespread in stands of mature hemlocks remaining within a 30-40 year old Douglas-fir harvest along Redwood Creek in Humboldt Co. (263A).

M262B

Oak Leafy Mistletoe

Phoradendron villosum
Contribution by: Paul Zambino

Oak mistletoe, *Phoradendron villosum*, existed at damaging levels in canyon live oak, in the vicinity of Crystal Lake Recreational Area, San Gabriel River Ranger District, Angeles NF, Los Angeles Co. (M262B), especially where canyon live oak predominates. Crowns of virtually all mature trees in the Canyon Oak Unit / Picnic area east of the junction of state Hwy 39 and forest road 3N09.2 were infected, with an average of 33% of crown canopy as mistletoe and a range of 10-70%. In areas near the junctions of 3N07.1 and 3N09.1, incidence was about 30%, whereas crown canopy as mistletoe averaged 16% with a range of 2-35%. Incidence dropped further going north into Snowslide Canyon, to about 12%, but degree of coverage was much more variable, with some trees very heavily infested. The average among infested trees was 42% of canopy, with a range from 4-85%. Many of the trees with severe mistletoe (>60% crown as mistletoe) have branch dieback with evidence of bot canker fungi (*Botryosphaeria* sp.) or general decline, with entire crowns becoming chlorotic.

Fig 56: Canyon live oak canopies with over 50% mistletoe have dieback and decline on the Angeles NF.

Photo: P. Zambino

Oak mistletoe represented 5-50% of crowns in 15 California black oaks within an acre of the Hawthorn Organizational Camp, Santa Clara and Mohave River Ranger District, Angeles NF, Los Angeles Co. (M262B).

Incense Cedar Leafy Mistletoe

Phoradendron libocedri
Contribution by: Paul Zambino

Decline of incense cedar continued in the Mill Creek drainage near Vivian Creek Recreation Site / Forest Falls Picnic Area, Front Range Ranger District, San Bernardino NF (San Bernardino Co., M262B). Foliage in 2011 was much thicker on many of the trees that had thin, lacy crowns in 2009 due to *Phomopsis* infections and abscission within green branchlets. Normal precipitation in 2010 and 2011 likely reduced stress in these trees. Yet thin crowns have persisted in the oldest, largest trees heavily infested with incense cedar leafy mistletoe at this site. In such trees, branches beyond mistletoe infections had linear cankers from unknown agents that resulted in significant branch dieback. For example, among 7 cedars in the picnic area near the Vivian Creek Trailhead having a range of 15-48” DBH, mistletoe averaged 36% of crown (range of 15-80%), dieback averaged 34% of crown (range of 10-65%), and two trees had dead spike tops. Cedars of all ages also had incense-cedar scale (*Xylococculus macrocarpae*) and the sooty mold (*Capnocybe spongiosa*).

Fir Leafy Mistletoe
Phoradendron pauciflorum
Contribution by: Paul Zambino

Fig 57: Mature white firs with decline and top kill from fir leafy mistletoe.

Photo: P. Zambino

Heavy fir leafy mistletoe infestation was observed in mature white fir at several locations: Mountain High Ski Lodge, off state Highway 2 in Wrightwood within the Santa Clara and Mohave River Ranger District, Angeles NF (Los Angeles Co., M262B); Deer Flats campground at the upper reaches of the San Gabriel watershed along forest road 3N07, San Gabriel River Ranger District, Angeles NF (Los Angeles Co., M262B); and John's Meadow Campgrounds, along Forsee Creek Trail, San Gorgonio Wilderness, San Bernardino NF (San Bernardino Co., M262B). Heavily infested trees had deformed and multiple-leader tops, which were often top-killed by fir engraver. At the currently closed Deer Flats Campground, 90% of white fir (average of 9 per acre) were heavily infested with fir leafy mistletoe. Of trees with deformed tops, about 20% had dead tops due to fir leafy mistletoe. Mortality was much higher at John's Meadow Campground—a wilderness campground closed in 2011 due to hazard trees. Here, over 40 firs were either dead and in various states of decay or moribund, with many additional living firs in various states of top decline surrounding the area. Examination of the broken tops of some trees indicated independent decay columns at several sites in the boles. Conks of the major decay organism of overmature fir, Indian paint fungus, *Echinodontium tinctorium*, were present on standing boles of some of the dead and dying firs with internal decay.

Declines

Bishop Pine Decline
Various Causes
Contribution by: Tom Smith

Fig 58: Bishop Pine decline.

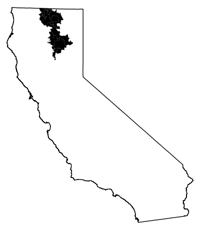
Photo: G. Guisti

Bishop pine stands throughout coastal Mendocino Co. (263A) were showing signs of decline and mortality. Entire stands were dying or exhibiting severe decline symptoms. The trees were all older specimens for the relatively short-lived species. Stands in the area appeared to have nearly all been established at the time of the last major forest fires in the area approximately 80-100 years ago.

Although there were some small infestations of western gall rust and bark beetles the main problem appeared to be general senescence due to old age and the lack of fire leading to regeneration in this fire dependent species.

Fire has been significantly reduced in the area as the county has been more urbanized and developed. Without fire or heat, the cones Bishop pines do not open and release their seed for new stand regeneration. Also stands have been broken up due to urbanization and development over time, both reducing their size and connectivity. Bishop pine stands impacted by death and decline are on both private land and parks and preserve areas.

Miscellaneous



M261D

Dodder
Cuscuta subinclusa
Contribution by: Don Owen

A dodder was infesting manzanita and squaw carpet in Shingletown and portions of Latour State Forest (Shasta Co., M261D). The CDFA Diagnostics Lab determined it was *Cuscuta subinclusa*, a widespread native species near the northern limit of its range.

M262B

Miscellaneous Decline of Incense Cedar
Multiple Agents
Contribution by: Paul Zambino

Scale insects and sooty mold were abundant in cedars in Crestline, CA (San Bernardino Co., M262B), along Crestline Road west of California Hwy 138, without causing apparent decline. In a residential area along Berne Drive in Crestline, two cedars had significant decline, but these were adjacent to pavement and may have had compromised roots. Other cedars of 4-28” DBH lacked decline despite being heavily infested with scales and sooty mold.

Abiotic Damage

Sunscald
Contribution by: Jack Marshall

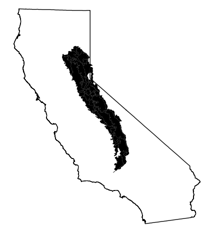

263A

Nearly 30 large coast redwoods were severely sun scalded after every other tree was removed from a landscape hedge in the Dry Creek Valley, west of Healdsburg (Sonoma Co., 263A). One small tree died, but most of the other trees had only dead branches or branch dieback. New buds along the sunburned branches began sprouting. No ensuing bark beetles invaded the trees at the time.

Snow Damage
Contribution by: Beverly Bulaon


Fig 59: Severe winter storms caused bole and limb breakage in this dense ponderosa pine stand, High Sierra RD, Sierra NF.

Photo: B. Bulaon


M261E

Snow loading and wind damage occurred throughout the southern Sierra Nevada Range in various locations, but most severely affected ridgetops, exposed sites, and dense stands (M261E). Trees at ridgetops and exposed areas were most often sheared mid-bole, with the whole crown left lying nearby. Entire groups of pine (stem counts of about 200 trees per ¼ acre, average diameter 7 inches) were sheared, leaving jumbled piles of debris. In older plantations where stands had been thinned, damage was decreased to only about two trees per acre and beetles only attacked broken trees.


M261F

Oaks in the foothills in the Gold Country of California (Tuolumne, Eldorado, Amador, Calaveras, Mariposa counties, M261F) were also severely affected when heavy snow loads and freezing temperatures happened in succession, a rare occurrence at these lower elevations. Large limbs were broken back at the main trunk and some with root disease or saturated soils simply toppled over.

Geothermal Heating
Contributions by: Beverly Bulaon and Martin MacKenzie


341D

Geothermal vents common in Inyo and Mono Counties were found to be the cause of death for more than 50 variably sized Jeffrey pines within the city limits of Mammoth Lake (Inyo Co., 341D). Even though Heterobasidion root disease (p-type) was identified at this site 15 years ago, current mortality was attributed to root kill by thermal heating. Smaller trees were directly killed by heat, while others along the periphery – still in green zones – were attacked by Jeffrey pine beetle.

Animal Damage

Animal damage is found across various forest types throughout California since many forest mammals are herbivorous and rely on plant forage for survival. In most cases, vertebrate animal damage does not result in heavy economic losses but there are exceptions. Additionally, most vertebrates are afforded levels of regulatory protection not often bestowed to invertebrate pests or weeds limiting management options. In some cases, particularly in urban settings, the very animals causing damage to trees are part of the human experience of appreciating “a place” such as a campus or park. A new progression of bear damage was observed on the North Coast in 2011. Rodent girdling and hog rooting damage were reported in several northern coastal counties.

Black Bear
Ursus americanus
Contributions by Greg Guisti and Jack Marshall

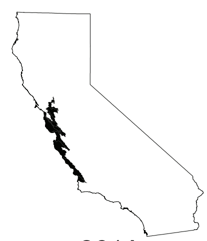
Black bears continued to cause serious economic impacts in 2011 to the commercial redwood lands in northwest California. For the first time black bear feeding damage was reported in Mendocino Co. in the Westport region in the Ten Mile River drainage (263A). On the large redwoods, girdling began some 60 feet up the bole. Most feeding occurred on coast redwood, but this year grand fir was reported damaged on the Mendocino site. It is generally believed that this may be the first recording of black bear feeding on grand fir in this region. Bark stripping feeding behavior was similar on grand fir as has often been reported on redwood.


263A

Bear damage continued in redwood and Douglas-fir stands off Bald Hills Road NE of Orick in northern Humboldt Co. (263A).

Norway (Sewer) Rat
Rattus norvegicus
Contribution by Greg Guisti

Norway (sewer) rat damage was reported to coast redwood on the Presidio in San Francisco (261A). The damage was reported as girdling to the base of the trees. The trees were approximately 20 years old with lower branches extending to the ground. Management options to minimize further damage included pruning the branches to expose the trunk near ground level and initiating rat population reduction activities.


261A

Feral Hogs
Sus scrufa
Contributions by G. Guisti

Feral hog rooting damage was reported in oak woodlands from Lake and Mendocino Counties (M261B). This was significant because this was the first time in the past decade where feral hog activity had been observed over large areas following the decline of feral hog populations in the late 1990s. This may be a prelude to an irruption of feral hog populations in the coastal counties and should be monitored in the coming years by land owners and managers.


M261B

Gray Squirrels
Sciurus sp.
Contributions by Greg Guisti, Jack Marshall, and Dave Rizzo

Rodent girdling, most likely by gray squirrels of branches and stems caused branch, top and whole tree mortality of big leaf maple in many areas of the north coast in 2011 (263A). Reports of similar damage to maples came from Skaggs Springs-Stewards Point Road, 25 miles west of Healdsburg in Sonoma Co. (263A). Squirrel damage was reported on the campus of University of California-Davis this year by faculty and graduate students (Yolo Co., (262A). A survey for rodent girdling on street trees along California Avenue and


262A

Fig 60: Branch dieback on an ornamental elm due to squirrels, UC Davis, Yolo County.

Photo: B. Oblinger

Shields Avenue was then conducted. A total of 141 trees were examined visually for current-year branch flagging associated with feeding damage. Only older, large-diameter elms (*Ulmus* sp.) had branches girdled this year. From Hutchison Hall eastbound on Shields Avenue to the East Quad, 11 of 20 elm trees surveyed had recent flagging. Other tree species had dieback that occurred during previous years and squirrel damage likely contributed to a portion of this necrosis. More damage is expected in the coming years due to the large squirrel population on campus.

Deer Browse
Odocoileus hemionus
Contributions by Greg Guisti

M261A

The Salmon River Ranger District, Klamath NF reforestation efforts on the Bear Wallow and Ukonom South wildfires began in spring 2010 and will continue through 2013 (M261A). Deer browse damage to spring planted ponderosa pine and Douglas-fir seedlings increased this year. Approximately 100 acres appeared to be heavily involved as part of a walk through the first few weeks after planting. Fall surveys will determine more accurately the extent of browse damage to the conifer seedlings.

Invasive Plants Conditions

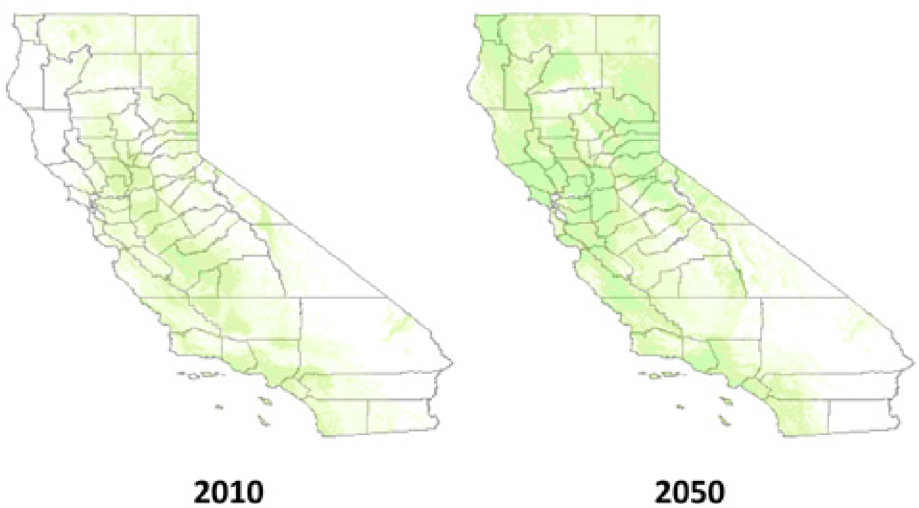
Updates to 2011 Invasive Plant Species Coordination

By David Bakke

California is home to 4,200 native plant species, and is recognized internationally as a "biodiversity hotspot". Approximately 1,800 non-native plants also grow in the state. A small number of these, approximately 200, are recognized by the California Invasive Plant Council as being invasive. Of these 200, there are many that occur in the forested areas of the state. There are several species or groups of species that may be considered especially troublesome in the forested areas of the state; this section focuses on those species.

In 2011, the California Invasive Plant Council (Cal-IPC) continued a statewide mapping effort with three interrelated projects: 1) mapping the current distribution of invasive plants using expert knowledge and collected GIS datasets; 2) modeling the potential suitable range for some species under climate change conditions; and 3) building an online system where users can contribute invasive plant data to a centralized site (calweedmapper.calflora.org). The statewide mapping effort will help land managers identify opportunities for regional collaboration.

Species distribution models are being used to project areas in California with suitable climate for specific species under current and future (2050) conditions. Cal-IPC has completed models for 29 species, focusing on those found in the Sierra Nevada, using GIS datasets contributed by public agencies and other organizations throughout California. When combined with the information on current distribution, the results of these models can help land managers with climate adaptation planning.



Map 4: Russian knapweed (*Acroptilon repens*); climate change scenarios; intensity of green shading indicates more suitable habitat

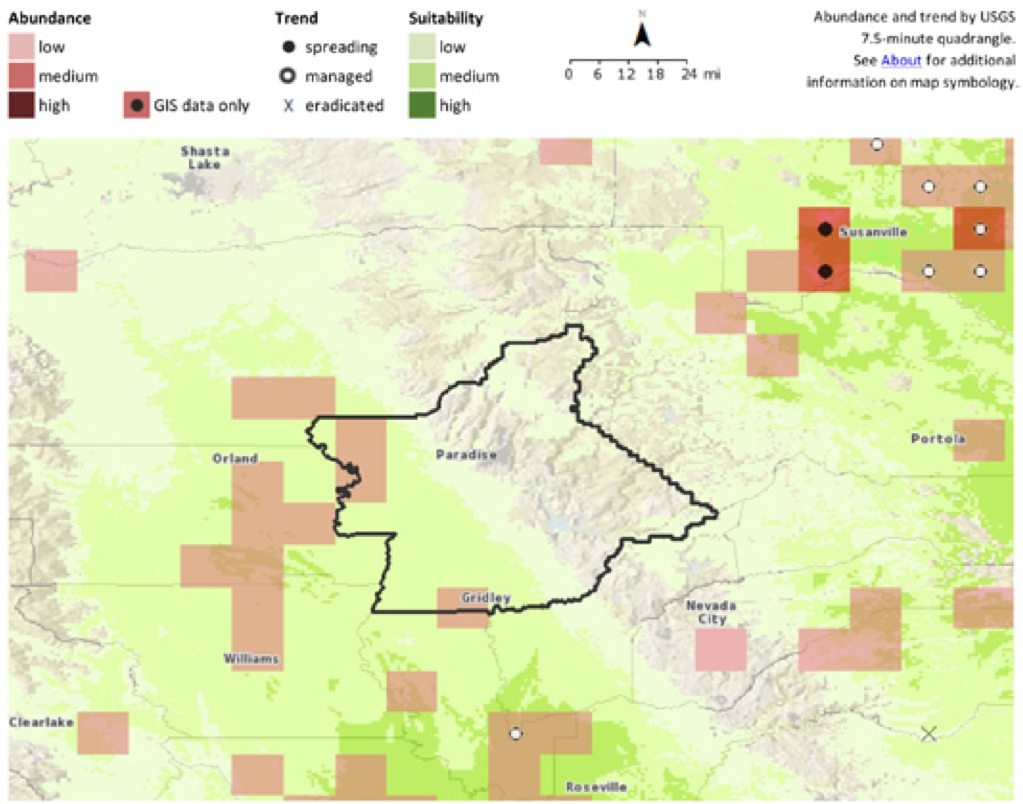
Map: California Invasive Plant Council (Cal-IPC), 2011

Cal Weed Mapper enables users to view maps, download recommendations of management opportunities for invasive plants for their area, and contribute new observations by USGS quadrangle. In addition, Cal-IPC contracted with Calflora to improve its capacity to collect and display spatial data.

Manuals of Prevention Best Management Practices (BMPs) were developed in 2011 for two audiences: land managers, and transportation and utility corridor managers. Both BMP manuals include practices compiled from other agencies and were reviewed by technical advisory teams composed of experts from many different agencies and organizations. These BMPs can be used to conduct trainings for work crews, to provide language for contractor

Map 5: Example of Species map for Russian knapweed (*Acroptilon repens*), highlighting Butte County, California, from CalWeedMapper.

Map: California Invasive Plant Council (Cal-IPC), 2011



specifications, or to develop educational materials for the public. The manual also includes ready-to-use BMP checklists designed for field crews. The Prevention BMP manual for transportation and utility corridors will be completed in early 2012, and it is hoped that these BMPs will be adopted for use by landowners and land managers throughout California.

A coordinated effort is underway to improve the availability and use of weed-free forage, straw, and aggregate in California. Cal-IPC is working with public agencies and land managers to develop a list of sources for weed-free forage and straw, and to post protocols for weed-free inspection developed by County Agricultural Commissioners and CDFA Pest Exclusion. The prevention team is also developing resources for weed-free aggregate; these include protocols for inspecting gravel pits, sample contract language for land managers working on construction and maintenance projects, and a manual for quarries/gravel pits interested in producing weed-free aggregate.

Severe budget cuts to CDFA are impacting many programs, such as Weed Management Areas (WMA), which will no longer receive funding. Budget cuts will also result in decreases in the invasive plant biocontrol program, technical assistance to landowners, and staffing at inspection stations. The budget decreases will cause changes to these programs for years to come.

Appendix A contains a brief description of the CDFA noxious weed ratings. Invasive plant reports include scientific names, common names, and risk ratings. For complete descriptions, go to page 93.

New 2011 Species Reports

Shiny Geranium
Geranium lucidum

Shiny geranium was found in two areas in Del Norte Co. along Highway 101, about ½ acre in total. Manual hand removal and bagging by California Conservation Corps (CCC) crew and Caltrans was completed in June 2011 on one site (0.04 acres). At the time, most plants were developing seed pods, although flowers were still present. There is a risk of rapid spread primarily downhill and with water. If established, it will affect the understory forb component of the redwood forest.

Fig 61: Shiny Geranium (*Geranium lucidum*) near Crescent City

Photo: D. Bongio, CalTrans

Large Leaf and Canary Island St. Johnswort
Hypericum grandifolium and *H. canariense*

The Bay Area Early Detection Network (BAEDN) field verification efforts of invasive plant occurrence data have led to the first North American discovery and documentation of invasive large leaf St. Johnswort (*Hypericum grandifolium*). *H. grandifolium* is currently known from two locations only in Marin Co. BAEDN is investigating nearby Hypericum populations in search of additional *H. grandifolium* occurrences, and is working with landowners and partners on the eradication of all *H. grandifolium* infestations. BAEDN outreach to partners about this high priority detection led to a subsequent detection and report by the National Park Service. BAEDN worked with Caltrans and contractors to remove this occurrence as well. BAEDN partners will continue to detect, report, and remove this new threat. Eradication efforts began in November.

Fig 62: Large-leaf St Johnswort (*Hypericum grandifolium*)

Photo: J. Egert

Canary Island St. Johnswort (*H. canariense*) is known from only a handful of U.S. infestations – in Maui and in several coastal California sites. Most of the known California populations are small, although a large stretch of coastal scrub has been invaded along the San Mateo and Santa Cruz coastline in the vicinity of Año Nuevo State Park. The Peninsula Open Space Trust, California State Parks, the San Mateo Resource Conservation District, BAEDN, and the US Fish and Wildlife Service's Bay Area Coastal Program are coordinating with neighboring landowners and stakeholders on a multi-year eradication effort. California State Parks and Audubon Canyon Ranch also continued eradication efforts against Marin Co. infestations. Canary Islands St. Johnswort is spreading rapidly on the south coast of Santa Barbara Co. This is a particularly troubling invader in southern California and could be on the verge of dramatic spread.

Fig 63: Canary Island St. Johnswort (*Hypericum canariense*), work in San Mateo Co.

Photo: S. Dardenelle

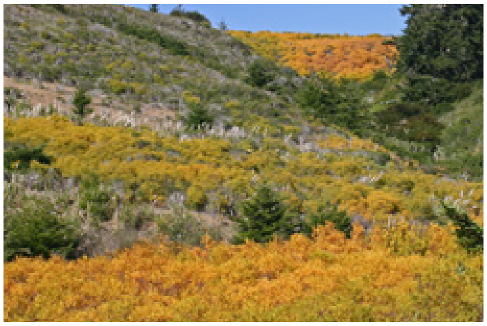


Fig 64: Canary Island St. Johnswort near Pescadero, CA

Photo: N. Kramer, Kramer Botanical

Fig 65: *Alyssum murale* (left) and *Alyssum corsicum* (right) growing near O'Brien, Oregon

Photo: M. Jules, USFS

Fig 66: Field of yellowtuft alyssum near O'Brien, Oregon

Photo: K. French, Oregon Dept of Agriculture

Yellowtuft Alyssum
Alyssum murale, A. corsicum
Cal-IPC red alert species at 2010 and 2011 meetings

Currently found in Southern Oregon. In the late 1990's, Viridian Resources, LLC with the assistance of USDA and OSU imported two non-native species of Alyssum adapted to serpentine soils (*A. murale* and *A. corsicum*) to use for "phytomining." The plants were purported to accumulate nickel from the soil and were to be harvested and burned to obtain the nickel from the ash. The project failed. Viridian did not follow the agreed upon Best Management Practices, and in 2005, both species were found growing far from planted sites. Both species were listed in Oregon as noxious weeds in 2009. Large scale efforts to control these two species began in 2009. Both species of alyssum are spreading in widely diverse areas around O'Brien, OR and on the Siskiyou NF.

Licorice Plant
Helichrysum petiolare

This escaped ornamental shrub is aggressively invading coastal scrub habitat around Mount Tamalpais in Marin Co. BAEDN is coordinating with the National Park Service, Audubon Canyon Ranch, and California State Parks to ensure treatment for all known wildland occurrences in Marin.

Fig 67: Licorice plant (*Helichrysum petiolare*), Mt Tamalpais, Marin Co.

Photo: D. Gluesenkamp

Ongoing Target Species

Yellow starthistle
Centaurea solstitialis
CDFA – C; Cal-IPC - High

Yellow star thistle (YST) is probably the most common and well known noxious weed in California. YST was introduced to California from its native Southern Europe in the 1850's and now infests approximately 20 million acres in the State. Most forested landscapes see YST encroachment on roads first, then openings, and certainly in areas that have burned recently. YST has shown it can invade most bioregions. It can grow into dense stands, crowding out native vegetation, providing physical barriers to recreation and access, reducing forage and land values, and depleting soil moisture. Although yellow starthistle is too extensive in California to be eradicated, within many of the forested areas of the state, localized eradication or containment is a goal. The goal in the Sierra Nevada Mountains is to establish a containment line for it in the foothills. It is hoped that by controlling YST at the eastern leading edge, that millions of acres of forested lands in the mid and upper elevations of the Sierra Nevada can be protected.

Many counties in the Sierra foothills conduct cooperative YST control projects with private landowners through some type of cost share activity. In most cases the herbicide is provided by the county while the control work is paid by the landowner. The abnormally wet and long winter of 2010-11 caused increased germination and survival of yellow starthistle throughout California in 2011.

Highlights:

Fig 68: Spraying yellow starthistle along the leading edge in Calaveras Co., Ridge Road and Highway 24

Photo: K. Wright, Calaveras County Dept of Ag

- Calaveras Co. – YST has spread throughout most of the county. Many ranchers with problems have been spraying their pastures once every three years.
- Stanislaus NF - treated 165 acres of YST with prescribed fire in the Jordan YST Burn Project and 11 acres of YST in the Jenkins YST Burn Project.
- Mariposa Co. - the Yosemite NP invasives team was funded to treat YST in the Merced River Canyon on Stanislaus NF lands on about 15 acres. This is a multi-agency weed control project involving the Stanislaus and Sierra National Forests, Yosemite NP, Mariposa Co., the Upper Merced Watershed Coalition, and BLM.
- El Dorado Co. - Overall, there seemed to be significantly more yellow starthistle surveyed and treated this year than last year on the Highway 50 corridor due to the abnormally high amount of precipitation. About 4 acres were treated in 2011.
- Alpine Co. – El Dorado/Alpine Ag Commissioner's Office staff worked with the Washoe Indian Tribe of California and Nevada to treat small areas of yellow starthistle at their community in Woodfords.
- Fall River RCD - About 60 people requested assistance to treat starthistle infestations resulting in 25 acres (involving 3 landowners) treated in spring 2011.
- Lassen Honey lake RCD - A 14 acre infestation in the Bass Hill Wildlife Area was manually treated, with 600 plants extracted from the ground and left on-site.
- Mariposa Co. - Outreach was made to an infested quarry adjacent to the entrance to Yosemite NP to allow treatment of the yellow starthistle infestation, which is scheduled for fall 2011. In addition treatments were made at the County dump, as this was considered a source for new infestations.
- San Bernardino NF and Co. – a population of YST was discovered while doing surveys

for the Oak Glen Hazardous Fuels Reduction project area on the San Bernardino NF. The population spanned FS and private land. The forest worked with Inland Empire Resource Conservation District (IERCD) staff who worked with the private land owners to spray the populations on private property, as well as several acres of land owned by Yuciapa Valley Water District. Urban Conservation Corps (UCC) crews pulled YST prior to seed development on FS land.

- San Diego Co. – 50 acres were treated, with a 40% reduction in numbers since last year. Eradication is still the goal.
- Madera Co. - All roadside areas treated in 2010 were revisited and treated as needed in July 2011. Additional roadside infestations (outbreaks or areas that had not been treated in 2010) were treated. A total of about 9 acres were treated.
- Placer Co. – Completed survey of Interstate 80 between Colfax and Donner Summit, and in Foresthill area. 11 net acres were treated, which represents an increase over previous years.
- Tulare Co. - Increased the amount of participants in county spray program to the highest participation level since program started; there were 58 sites treated covering 381.5 acres.
- The ARRA-funded CCC strike teams treated yellow starthistle in the Cosumnes River Preserve, Pacheco State Park, Foothill Open Space in Santa Barbara Co., and the Indian Creek area in Alpine Co.
- There are ongoing control programs in Del Norte, Siskiyou, Plumas, Placer, Tuolumne, Riverside, and Sierra Counties, as well as on the Angeles, Eldorado, Klamath, Lassen, Los Padres, Modoc, Six Rivers, Plumas, Sequoia, Sierra, Stanislaus, and Tahoe National Forests.

Knapweeds (spotted, diffuse, meadow, squarrose)
Centaurea biebersteinii (spotted)
CDFA – A; Cal-IPC - High
C. diffusa (diffuse)
CDFA – A; Cal-IPC - Moderate
C. debeauxii ssp. thuillierii (meadow)
CDFA - A; Cal-IPC - Moderate
C. virgata Lam. Var. squarrose (squarrose)
CDFA – A; Cal-IPC - Moderate

Bushy annuals to perennials with deep taproots, these are highly competitive plants that can form dense stands excluding native vegetation and wildlife. The genus *Centaurea* has over 500 species worldwide, none of which are native to California.

Fig 69: Dean Kelch, CDFA holding spotted knapweed pulled in eastern Shasta Co.

Photo: D. Bakke

Spotted knapweed is a biennial or perennial is extremely invasive wherever it occurs. Flowers are white, pink, or purple, and the flower bracts (phyllaries) are without spines. Seed viability of this species has been observed to be anywhere from eight to fifteen years. Spotted knapweed can also reproduce vegetatively from lateral roots below the soil surface. A native of Europe, it has been found in all the areas of the state except for the deserts.

Native to southeastern Eurasia, diffuse knapweed is typically a biennial plant that forms dense infestations. Flowers are white, pink, or purple and the phyllaries are spine-tipped. It is found throughout the state except the desert areas.

Native to Europe, meadow knapweed is a less

common perennial plant similar to spotted knapweed. Flowers are pink to purple and the phyllaries are not spiny. Found primarily in the northern part of California.

Native to Asia, squarrose knapweed is a perennial and is concentrated in the north part of the State. Most populations in forested areas are still small and easily controllable provided annual visits continue. The flowers are pink to pale purple and the phyllaries are spine-tipped.

Work on knapweeds in California is geared towards eradication of local populations:

Highlights:

- Lassen NF - Relatively few occurrences of spotted knapweed are present on the Eagle Lake and Hat Creek Ranger Districts - all received multiple visits where they were hand treated with the goal to eradicate this species from the forest. There are a few occurrences of squarrose knapweed and all are manually treated at least once annually. Most sites are very small. One infestation at Brush Mountain on Hat Creek is over 100 acres. Insect biocontrols were released at this site a few years ago and have become established.
- Del Norte Co. - Meadow knapweed was treated at one new site. Three treatment sites had over 90% reduction in plants from last year. Other sites had lower, but significant reductions in infestation.
- Alpine Co. - El Dorado/Alpine Ag Commissioner’s Office staff worked with the Washoe Indian Tribe of California and Nevada to treat diffuse knapweed at their community in Woodfords.
- Fall River RCD - acreage of squarrose knapweed grew due to locating new sites, including a large (120 acres) valley of 75% coverage (located in Shasta Co.). The landowner is in the process of reclaiming land, which explains the large acreage. One other large 16 acre site (in Lassen Co.) was sprayed along the periphery. Two other sites were sprayed in the spring with about 80% control.
- El Dorado Noxious WMA, Sierra Pacific Industries, and the Eldorado NF, Pacific RD – along Silver Creek is an ongoing spotted knapweed eradication project; only known population of spotted knapweed in western El Dorado Co. Established after the 1992 Cleveland Fire which demonstrates the need for continuous and long-term efforts. Where a very large population of spotted knapweed, roughly 500 plants, was surveyed and treated in the northwestern project area in 2010, only three plants were found in 2011.
- Humboldt Co. WMA - funded the Mid-Klamath Watershed Council to work with the Yurok Tribe to survey areas for meadow knapweed near Weitchpec, CA during July 2011. Emphasis was placed on surveying Yurok Tribal lands which were recently purchased from Green Diamond Resource Company. All areas surveyed were in close proximity to known meadow knapweed populations. Two new knapweed sites were discovered. In addition, approximately 90 roadside miles were surveyed covering 436 acres. 3 acres on Yurok Tribal lands were treated by mowing, cutting, digging, and mulching.
- Six Rivers NF - The Forest has been actively managing all knapweeds occurrences on the forest for 6 to 8 years. Diffuse, meadow, and spotted are geographically limited and geographically distinct. Management focus is on leading edges and satellite occurrences. Of the eight satellite occurrences of meadow knapweed monitored in 2011 two were no longer detected and three indicated a downward trend in the number of plants. Of the 40 satellite occurrences of diffuse knapweed monitored on the southernmost district, 14 were no longer detected, 3 indicated a downward trend, 11 indicated little to no change, and 12 indicated an upward trend.
- Siskiyou Co. WMA and Klamath NF – Several new localities of spotted and diffuse knapweeds were located and treated. There was a good decrease in acres of squarrose knapweed this season, especially in the Hawkinsville area. There was an increase in meadow knapweed acreage due to several new infestations found in the Lower Klamath River corridor. Spotted and diffuse knapweeds in the McAdams creek

area have shown the least progress mostly due to a large ranch that has recently shut down. With the lack of cattle grazing and no irrigation both knapweeds have increased on this property.

- Calaveras Co. –The spotted knapweed infestation in Cottage Springs has been greatly reduced. What was an eleven acre infestation two years ago was reduced to four last year and is now down to one half acre. The Winton Road knapweed occurrence showed similar improvement.
- Stanislaus NF – Five infestations (spotted) have been found in last two years on Miwok RD; treatments not yet begun.
- The ARRA-funded CCC strike teams treated knapweeds Del Norte Co. (meadow), Kern Co. (spotted), and Placer Co. (spotted).
- There is other ongoing control work on knapweeds in Eldorado Co. (diffuse), Lassen Co. (spotted, squarrose), and Shasta Co. (squarrose, spotted, diffuse) and on the Eldorado, Inyo, Modoc, Plumas, San Bernardino, Shasta-Trinity, Stanislaus, and Tahoe National Forests and the Lake Tahoe Basin Management Unit.

Saltcedar, Tamarisk
Tamarix ramosissima
CDFA – B; Cal-IPC - High
Tamarix sp.

Saltcedar is an aggressive invader of riparian areas in arid regions throughout the western United States. Tamarisk replaces native riparian species and can degrade habitat for local wildlife, increase wildfire danger, and decrease stream flows. Its name derives from its ability to extract salts from the soil through the roots and excreting the salt from the leaves, increasing surface soil salinity, which in turn inhibits native plant establishment and growth. Flowers are white to pink.

Fig 70: Tamarisk control on San Bernardino NF

Photo: D. Nelson, San Bernardino NF

Highlights:

- San Diego Co. – ongoing eradication projects in Lusardi County Open Space and Bernardi Lakes/Maranatha County Open Space (San Dieguito watershed). The ARRA-funded CCC strike teams treated tamarisk in this watershed as well.
- Kern Co. – Removals of tamarisk were conducted on Kern River Preserve and Onyx Ranch in eastern Kern Co.
- There is ongoing control work for tamarisk in Inyo, San Bernardino, Riverside, and Mono Counties and on the Cleveland, Inyo, and San Bernardino National Forests.

Fig 71: Toadflax stem weevil (*Mecinus janthinus*), adult and larvae, near Susanville, CA

Photo: D. Bakke

Dalmatian toadflax
Linaria dalmatica subsp. *dalmatica*
CDFA – A; Cal-IPC - Moderate

This perennial plant was originally brought from the Mediterranean area of Europe in the late-1800's as an ornamental because of its showy snapdragon-like yellow flowers. The wide-ranging and deep root system can generate new shoots, and root fragments can develop into new plants. It is found throughout California. Seed production

is prolific and seeds can remain viable for 10 years.

Highlights:

- Lassen NF - Only one occurrence is known to the forest adjacent to the Chester Airport. This site is manually treated multiple times on an annual basis.
- Lassen Honey Lake RCD - Herbicide treatments were conducted in the Susan Ranch Park on Dalmatian toadflax. One Dalmatian toadflax infestation that was discovered and mapped in 2008, with 100 plants, and subsequently treated in 2009, 2010 and 2011, is now down to only 5 plants.
- The ARRA-funded CCC strike teams treated Dalmatian toadflax in the Hungry Valley State Recreation Area in May and June.
- There are ongoing localized eradication programs on-going in Siskiyou, El Dorado, Alpine, Modoc, and Lassen Counties and on the Stanislaus NF.

Scotch thistle
Onopordum acanthium ssp. *acanthium*
CDFA – A; Cal-IPC - High

Fig 72: Mature Scotch Thistle in Modoc Co.

Photo: D. Bakke

Native to Europe, this biennial species was once used in Scotland as a barrier around castles. Scotch thistle has spiny leaves, conspicuously spiny-winged stems and spiny flower heads with white or purple flowers. It is most easily controlled in the early rosette stage, as once this plant reaches mature size (1.5 – 3 m tall) it can grow into nearly impenetrable thickets. Typically grows in disturbed areas, often in areas with high soil moisture, and can be found throughout the state. It reproduces via seed, which can remain viable in the soil for several decades.

Highlights:

- Pacific Gas and Electric Company (PG&E) treated Scotch thistle in partnership with Placer Co. and the Tahoe NF along system powerlines and canals.
- Lassen NF - This species is found mostly on the Hat Creek RD where it is scattered throughout the northern portion of the district. All sites are treated manually at least once on an annual basis. One large site at Bidwell Ranch is visited multiple times by both Lassen NF and Shasta Co. crews. Due to three years of surveys and treatment using BAER and Lassen NF funds nearly all occurrences found after the Straylor Fire in 2006 are believed eradicated.
- Fall River RCD – Most Scotch thistle sites received chemical treatment (19 landowners,~25 sites w/multiple locations within most sites). Sites that were revisited and missed sites were treated by chopping or digging. Two new sites were located during late summer (setting seed); these were mapped and will be targeted next spring.
- There is on-going eradication work on localized populations in Modoc, Siskiyou, Calaveras, Lassen, and Shasta Counties and on the Klamath, Modoc, Tahoe National Forests and the Lake Tahoe Basin Management Unit.

Musk Thistle
Carduus nutans
CDFA – A rated; Cal-IPC - Moderate

Native to Europe, this biennial species was introduced in the early part of the twentieth century and is now relatively widespread in the United States although in California its current

distribution is largely limited to the Klamath Range, Cascade Mountains, Modoc Plateau, and the Northern Sierra Nevada Mountains. The stems have prickly wings and the leaves are prickly. Flowers are purple to pink, borne on solitary stems that often are bent over, leading to another common name of nodding thistle. Seeds are normally not long-lived in the soil.

Highlights:

- Nevada Co., Nevada/Placer WMA, and the Tahoe NF - The current infestation of musk thistle within Nevada Co. is at a critical juncture. The size and locations of these populations are at a stage where eradication remains a viable option. By increasing control actions, the hope is to prevent the spread of musk thistle into forested lands downriver from Boca Hill and northward into Sierra Co. In 2011, 33 acres were treated in the Glenshire, Hirschdale and Truckee River Canyon areas. The County collaborated with California Department of Fish & Game, CDFA, and the California Conservation Corps to treat the largest musk thistle infestations in the Truckee River Canyon in June and July. Most musk thistle infestations were surveyed and treated at least twice. Pre- and post-treatment photographs of infestation sites were taken. The Tahoe NF treated several hundred acres around Boca Hill and Boca Reservoir.
- There is on-going eradication work on localized populations in Siskiyou Co. and in the Lake Tahoe Basin Management Unit.

Thistles (Bull, Canada, Italian, Plumeless)
Cirsium vulgare (Bull)
CDFA – C; Cal-IPC - Moderate
Cirsium arvense (Canada)
CDFA – B; Cal-IPC - Moderate
Carduus pycnocephalus (Italian)
CDFA – C; Cal-IPC - Moderate
Carduus acanthoides (Plumeless)
CDFA – A; Cal-IPC - Limited

The most common of these invasive thistles found in forestland in California is the bull thistle. This biennial species reproduces from seed and is often found in recently disturbed areas, such as harvest units, burned areas, and roadsides, and can be a direct competitor with conifer seedlings. It can be found throughout California. Canada thistle, a perennial, forms dense clumps with an extensive root system. It can reproduce vegetatively from the extensive root system as well as from seed. It is also found throughout California. Italian thistle is an annual with stems that have prickly wings and prickly leaves and is found throughout northern and central California. Plumeless thistle is a biennial that is closely related to both Italian and musk thistle and is found primarily within Northern California. Wooly distaff thistle is an annual species with spiny leaves and yellow flowers.

Generally thistles are more commonly found in pastures and meadows, in riparian habitats, and in disturbed sites (along roads, powerlines, etc). Thistles reduce recreational access, grazing value, and wildlife habitat. If dense enough, once they dry out at the end of the summer they can rapidly increase rates of fire spread, carrying fire into and through forested areas, especially plantations.

Highlights:

<u>Bull thistle</u>
Because of its widespread distribution, there is little management focused on bull thistle in California forests. However, in sensitive habitats, there is on-going control activity:

- The ARRA-funded CCC strike teams treated bull thistle in Camp San Luis, along the Klamath River, and in the Foothill Open Space in Santa Barbara Co.
- Stanislaus NF – have been treating bull thistle on a slide in the Carson Iceberg wil-

derness since 2007; down to very few plants. The treatment has been accomplished with help from the Stanislaus Wilderness Volunteers, the Summer of Success youth employment program, and the Central Sierra Environmental Resource Council. This Wilderness was surveyed this year and other infestations were found in the areas of two older fires and scattered infestations in other areas. A draft wilderness invasives plan is being developed which includes surveying areas of disturbance for a couple of years following the disturbance with the intention of avoiding such large infestations.
- There is ongoing control work against bull thistle in Inyo and Mono Counties, the Eldorado, Lassen, Modoc, San Bernardino, Sequoia, and Sierra National Forests and in the Lake Tahoe Basin Management Unit.

<u>Canada thistle</u>
- Lassen NF - Canada thistle is found on the forest scattered throughout the Almanor Ranger District and southern portion of the Eagle Lake Ranger District. Most sites are within riparian areas and are hand treated annually to reduce spread.
- Stanislaus NF – Eradication efforts continue on the few remaining stems in the Carson-Iceberg Wilderness.
- The ARRA-funded CCC strike teams treated Canada thistle in the Channel Islands.
- Lake Tahoe Basin - Small, isolated populations of Canada thistle in the south end of the Basin are being treated, with the goal of eradication.
- On-going eradication work is occurring on small populations in Modoc, El Dorado, Lassen, and Inyo Counties and the Modoc, Six Rivers, and Plumas National Forests.

Fig 73: Photo taken June 2003, Dunns Ranch. Shows density of plumeless thistle when work started. Compare to 2011 picture. Jay Cordova in picture.

Photo: S. Casteel, Calaveras Co Ag Dept

<u>Italian thistle</u>
- There are on-going eradication efforts in San Diego Co. (Lusardi County Open Space, Bernardo Lakes/Maranatha County Open Space) and on Klamath, Lassen, Six Rivers, Plumas, and Sierra National Forests. The ARRA-funded CCC strike teams treated Italian thistle in Solano Co. and Pacheco SP.

<u>Plumeless thistle</u>
- Calaveras Co. – Sprayed Roundup (glyphosate) and Milestone (aminopyralid) at the plumeless thistle site on the Dunn Ranch. What was a five acre infestation has been reduced to half an acre, with scattered plants.

Fig 74: Person in photo is Steve Farris, Calaveras County Dept of Ag. Shows scattered nature of thistle after several years of control. Compare to picture 73, above.

Photo: K. Wright, Calaveras County Dept of Ag.

Perennial pepperweed, tall whitetop
Lepidium latifolium
CDFA – B; Cal-IPC - High

Perennial pepperweed, a native of Eurasia, has small white flowers and an extensive, creeping root system. It can reproduce vegetatively from the root system, and physical disturbance of the root systems can lead to further spread as new plants grow from root fragments. Highly competitive, it often forms dense colonies that displace native vegetation and wildlife. It is

typically found in moist or seasonally wet sites, including wetlands, riparian areas, meadows, roadsides, and irrigation ditches. It is found throughout California.

Highlights:

- Lassen Honey Lake RCD - Herbicide treatments were conducted on fifty acres of perennial pepperweed along the shores of Honey Lake in Northeast California during 2011. The project focused on the high water-mark of Honey Lake in the Amedee Wetlands area. In this area, tall whitetop has invaded prime Carson Wandering Skipper (*Pseudocopaeodes eunus obscurus*) habitat, a Fish & Wildlife Service Endangered Species.
- Inyo/Mono Counties - Perennial pepperweed populations in Long Valley were treated twice and are nearly eradicated. Tinnemaha Reservoir and Los Angeles Aqueduct areas were resurveyed and treated twice; populations there are in decline 22% over 2010.
- Kern Co. – along the South Fork Kern River Wildlife Area, in eastern Kern Co., adjacent to the Sequoia NF is an ongoing effort to eradicate perennial pepperweed. Three applications of Telar were applied on three ranches. Evaluation of previous treatments indicated 90% reduction in pepperweed populations.
- Contra Costa Co. – Stop the spread (containment) program started in 2002. Targeted infestations are in agricultural core areas and on CalTrans rights-of-ways. The County estimates that there are in excess of 2,000 untreated acres of this invasive plant in the county. In 2011, 13.35 net acres were treated on a total of 919 gross acres that were surveyed, using mostly chlorsulfuron (Telar®) and some glyphosate.
- The ARRA-funded CCC strike teams treated perennial pepperweed in the Cosumnes River Preserve, Pacheco SP, Hallelujah Junction, near Carpenteria, and near Floriston.
- There are on-going eradication efforts in Marin, Sonoma, El Dorado, Siskiyou, Calaveras (along Highway 4), San Diego, Lassen (including Fall River RCD), and Modoc Counties and on the Eldorado, Inyo, Lassen, Plumas, and Sequoia National Forests, and the Lake Tahoe Basin Management Unit.

Leafy spurge, oblong spurge, carnation spurge
Euphorbia esula (leafy)
CDFA – A; Cal-IPC – High (Alert)
E. oblongata (oblong)
CDFA – B
E. terracina (carnation)
CDFA – B; Cal-IPC – Moderate (Alert)

Leafy spurge is a perennial plant that has a deep (up to 9 m) and creeping root system and establishes large clonal colonies. It is an erect plant with milky white sap that can be toxic to humans and some livestock if ingested. Although fairly common in some western states, in California the distribution is limited to a large infestation in north central California and a few smaller populations in other northern California counties. It is considered a high priority for eradication.

Oblong spurge is uncommon in California, but is expanding. The root system is not as extensive as leafy spurge. The sap may have irritant properties, but toxicity problems have not been reported.

Carnation spurge, also known as false caper, is a short-lived perennial herb found on southern California's coast and in the Bay Area. Carnation spurge spreads by seed. The seed bank can last from 3 to 5 years. Carnation spurge is reported to cause dermatitis and vision impairment and has allelopathic properties. Carnation spurge can form dense patches in a wide variety of habitats such as disturbed grasslands, coastal bluffs, dunes, salt marshes, riparian areas and oak woodlands. Although carnation spurge was recently introduced to southern California and is not yet widely distributed, it has the potential to spread rapidly after fires and into undisturbed native plant communities.

Highlights:

- Alameda - Contra Costa Counties WMA – Eradication program on oblong spurge started in 2001. The goal is to eradicate it from the Alhambra Creek watershed in Martinez and to contain or prevent the spread of oblong spurge into new areas by treating all satellite and newly discovered infestations that occur in the central and eastern areas of the counties. Oblong spurge also occurs, mostly untreated, in the western area of Alameda Co. including the Berkeley Hills and in some riparian areas of western streams. There are efforts by some local groups to remove it along streams in these areas. In 2011 the WMA surveyed a gross area of 471 acres and treated 0.78 net acres. Herbicides used are glyphosate, dicamba (Clarity®) and aminopyralid (Milestone®) applied with backpack sprayers.
- Calaveras Co. – There has been an increase of oblong spurge along Railroad Flat and also around West Point. These have not yet been treated, except for a small spot treatment on a landowners pasture who was actively treating the site and asked for our assistance.
- Siskiyou Co. - Leafy spurge has been known to exist in Scott Valley of Siskiyou Co. for many years. In 2000, a cooperative survey revealed that leafy spurge sporadically infests over sixty miles of the Scott and Klamath rivers (in approximately 350 occurrences) in Siskiyou Co. Flood events have occurred since 2000 that have dramatically increased the spread of leafy spurge. In the spring of 2011, more than 300 letters were sent to landowners of properties to be surveyed in summer. The Lower Scott River survey resulted in 219 total sites (161 new sites) with an estimated 42,000 plants and 47 acres. The Klamath River survey resulted in 128 sites (70 new sites) equaling an estimated 22,000 plants and 25 acres. 3,710 acres were worked in 2011 (a 53% increase in private land worked over 2009). Surveyed 2,500 acres on the Klamath River from the Northern Siskiyou Co. border to the confluence of the Scott River to the Klamath River (including the banks of Iron Gate and Copco Lakes). No leafy spurge sites were observed in this area of the Klamath River, despite the fact that leafy spurge is located in Oregon just north of the border.
- Santa Barbara Co. – Carnation spurge has been found on numerous sites on the south coast of Santa Barbara Co. A small patch of this weed was found in May 2010, a first county record, on Highway 150 at its intersection with Highway 192. A second infestation was subsequently discovered approximately 4 miles west of Refugio Rd on the Gaviota Coast. In January 2011, a third infestation was discovered in Montecito. In March of 2011 a fourth and fifth infestation were found in Mission Canyon and on Stanwood Dr near Conejo Rd. A sixth detection was reported from Cliff Dr. near Flora Vista Rd. The Agricultural Commissioner is working on the eradication of this weed within the county.

Fig 75: Carnation spurge along Highway 150, Santa Barbara Co.

Photo: D. Chang, Santa Barbara County Dept of Agriculture

- Los Angeles Co., Antelope Valley RCD - The goal of this project is to limit the spread of carnation spurge by managing the species within the sensitive geographical area of the Palos Verdes Peninsula. Two treatments of approximately 3 acres (more than 3,700 plants) were completed along with mapping of 2011 populations.
- The ARRA-funded CCC strike teams treated spurge in Shasta and Siskiyou Counties.
- There is on-going eradication work on several other small infestations of leafy and oblong spurge in Shasta and Lassen Counties and on the Stanislaus NF.

Red sesbania
Sesbania punicea
CDFA – B; Cal-IPC – High (Alert)

Red sesbania is a deciduous shrub or small tree with compound leaves and red, pea-like flowers. Foliage, flowers, and seeds contain compounds that can be toxic to humans and animals when ingested. Seeds are borne in pods that are brown when mature; seed dispersal is mostly via flowing water. Red sesbania is native to South America. Red sesbania is an invasive weed of California riparian forests. In general that includes cottonwood, valley oak and California sycamore as the dominant canopy species. It is able to occupy low floodplains and high terraces in willow and cottonwood dominated riparian forests. During flood years, red sesbania can be distributed into the surrounding grasslands and oak woodlands. There is a major effort that began in 2010 to do statewide mapping of red sesbania and follow-up with the development of a statewide strategic plan. In the coming years, priority populations will be identified and targeted for treatment.

Highlights:

- Contra Costa Co. – Eradication program started in 2006. The treatment method is mechanical hand pulling. There are 12 known infestation areas in the county, with an estimated gross area of 40 acres. Three are in riparian areas and nine are on residential properties that were originally the result of ornamental plantings. All seedlings or saplings are removed at each property allowing no new seed formation, involving two to three site visits each year. The treated acreage in 2011 is 1 net acre. The number of plants removed/treated each year has been: 2006 - 878; 2007 - 833; 2008 - 492; 2009 - 2,059; 2010 - 1,997; 2011 - 2,838.
- Shasta Co. – Survey, mapping, and 20 acres of treatments along Churn Creek in Redding. Treatments used imazapyr herbicide.
- Sites in the Oroville and Thermalito area (9.7 acres) have been photographed, mapped, and treated with triclopyr herbicide. Eight historic sites were surveyed and appear to be eradicated. All sites north and east of Oro-dam Blvd have been eradicated.
- Ongoing work is occurring in Marin, Napa, and Solano Counties.

Tree-of-heaven
Ailanthus altissima
CDFA – C; Cal-IPC – Moderate

This is a fast growing deciduous tree with large compound leaves and a creeping root system (up to 15 m in all directions) that suckers freely. The leaves have an unpleasant skunky odor, especially when crushed. Clonal thickets are common, and can crowd out native vegetation and wildlife. Native to China, tree-of-heaven was introduced as an ornamental as well as a medicinal plant by Chinese immigrants during the Gold Rush. Flowers are greenish yellow to white. It is scattered throughout California except for deserts, Great basin, and areas east of Sierra Nevada Mountains. This species has been rapidly expanding in recent years in the oak woodlands and mixed pine/oak forests in the foothills of the Sierra Nevada Mountains.

Highlights:

- Santa Barbara Co./Los Padres NF – There are scattered plants in the Los Padres NF. There is a considerable infestation outside the forest at Los Olivos where Figueroa Mtn. Rd. crosses Hwy 154.
- Kern Co. – Removals of tree of heaven were conducted on Kern River Preserve and Onyx Ranch in eastern Kern Co.
- The ARRA-funded CCC strike teams treated tree of heaven along Putah Creek in Solano Co. and in Big Creek Ecological Reserve in Butte Co. Other ongoing control activities are being conducted in Western Shasta Co., and on the Klamath and San Bernardino National Forests.

Brooms (Spanish broom, Scotch broom, French broom)
Spartium junceum (Spanish)
CDFA – C; Cal-IPC – High
Cytisus scoparius (Scotch)
CDFA – C; Cal-IPC - High
Genista monspessulana (French)
CDFA – C; Cal-IPC - High

These species were purposefully introduced into California for erosion control. Although there are other species of broom in California, these are the three most common. These woody brush species can be found throughout the state, in low to mid-elevation woodlands and forests. As nitrogen fixers, these species affect the soil chemistry and therefore can encourage other invasive plant species to become established. They also crowd out native vegetation, often developing into dense monospecific stands. They provide strong competition to seedling conifer tree species. They represent lower forage values as compared to native vegetation. Brooms burn readily, and can carry fire into the tree canopy, so represent an increased risk of crown fire. They resprout after fire, and often there is a seedling flush as well, indicating they are well-adapted to fire disturbance. Brooms have a very long-lived soil seedbank, requiring a long-term effort for eradication.

Highlights:

Fig 76: Spanish broom (*Spartium junceum*) treated along Highway 299, Shasta Co., west of Redding

Photo: D. Bakke

<u>Spanish Broom</u>

- San Diego Co. – Within the San Dieguito watershed, both Spanish and French brooms are targeted for treatment. Along Artesian Creek, broom has been treated using cut-stump method with glyphosate.
- There is on-going eradication work against Spanish broom in eastern Shasta Co., Butte Co. (Butte Forest Ranch), and on the Angeles, Los Padres, San Bernardino, Shasta-Trinity, Sierra, and Tahoe National Forests.

<u>Scotch broom and French broom</u>

- Found alongside highways throughout the forested areas of central and northern California (e.g., Interstates 5, 80, US 101, 50) including the Coast Range, Cascades, and Sierra Nevada Range.
- Shasta Co. - Scotch broom is prevalent in Montgomery Creek in Redding and NE of Redding near Shasta Dam. Much of this is a re-introduction from adjoining parcels and moving into adjacent established forest communities. The affected area is approximately 400-600 acres.
- San Mateo Co. – Restoration to improve habitat for the endangered fountain thistle involved the manual removal of French broom.
- Western Shasta RCD - Seven miles and 8 acres along Highway 299 was treated for populations of Scotch broom from Whiskeytown National Recreation Area to the Trinity Co. line.
- Trinity Co. RCD - Fifty miles and 195 acres along Highway 299 was treated for populations of Scotch broom and Dyers woad from the Shasta Co. line to the Trinity Co. line at Salyer. Photo monitoring and GPS points were completed within the infestations throughout the entire project area.
- Tahoe NF – ongoing control work on Scotch broom (185 acres treated in 2011). In addition, a local group – the Scotchbroom Challenge - has increased the knowledge of the invasiveness of these brooms through numerous manual weed pull days in Nevada and Placer Counties. The Scotchbroom Challenge Group has been active in Nevada Co. for many years. 2011 marks the first year that Placer Co. accepted

the challenge.

- The ARRA-funded CCC strike teams treated Scotch Broom near McKinleyville and several locations in Del Norte Co. There are ongoing management efforts on the Angeles, Eldorado, Klamath, Lassen, Mendocino, Six Rivers, Plumas, Shasta-Trinity, Sierra, and Stanislaus National Forests, and the Lake Tahoe Basin Management Unit.

Cheatgrass, Downy Brome
Bromus tectorum
CDFA – not rated; Cal-IPC - High
Medusahead
Taeniatherum caput-medusae
CDFA – C; Cal-IPC - High

An annual grass, cheatgrass is native to Eurasia and is found throughout California. It is the most common forage species in the Great Basin. Medusahead, another annual grass, is native to Europe and has been in the western United States since the late 1800's. While cheatgrass is common throughout California, medusahead is more common in the oak woodlands. These two grasses are formidable competitors with native grasses and forbs. Once established, medusahead can reach densities of 2,000 plants per square meter, creating a dense litter layer that suppresses other plants and contributes to fire danger in summer. Although they are not shade tolerant, thus limiting their development in forested areas, they can rapidly invade disturbed sites such as logged areas or wildfire areas. Once established, they deplete soil moisture earlier in the season and cure earlier than native plants. Because of the early curing, they can affect wildfire timing and interval, resulting in fires occurring more often and earlier in the season. This change in fire regime works against the native species and provides ideal conditions for these grasses to dominate a site. This is especially an issue in the east side pine type and the Modoc plateau.

Highlights:

- Yosemite NP - Cheatgrass is widespread in Yosemite. This year park scientists initiated an herbicide effectiveness study using aminopyralid. Field staff and volunteers continue to document its distribution in the park and target some treatments to slow its spread in Wilderness.
- Stanislaus NF - cheatgrass is tracked because of possible impacts to sensitive plants on volcanic lahars. Surveys last year showed medusahead grass has spread considerably in areas that had fires in the 1980s and 1990s.
- There are ongoing localized management efforts on the Angeles, Eldorado, Lassen, Plumas, Stanislaus, and Tahoe National Forests for both species.

Barbed Goatgrass
Aegilops triuncialis
CDFA – B; Cal-IPC – High

A winter annual grass that is closely related to wheat and can hybridize with it. Barbed goatgrass is native to Mediterranean Europe and Western Asia. Inhabits dry, disturbed sites, fields, pastures, and roadsides; also undisturbed grasslands and oak woodlands. Tolerates serpentine and hard, shallow, dry, gravelly soils. Can be found throughout the state to 5,000 foot elevation. Goatgrass flower spikes are distinctive and unlikely to be confused with other weedy annual grasses. Barbed goatgrass tends to mature later than most other rangeland annual grasses. Awns stiff, sharp, minutely barbed. Seedhead breaks apart, and pieces are sharp and can injure livestock. Reproduces by seed; seeds drop near parent plant. Seeds can remain dormant for 2 years or more.

Highlights:

- Stanislaus NF - barbed goatgrass has spread to nearly 5,000 foot elevation along

Highway 108 and is spreading on other forest roads. The Stanislaus has hand-pulled small patches. Appears to be spreading on private rangelands at lower elevations.

- Contra Costa Co. - one site was hand-pulled, one site was burned (Camp Parks), three sites were sprayed (2.3 acres treated in total). One site remains untreated in the County.
- There are ongoing, localized management efforts on the Plumas and Tahoe National Forests.

Giant Reed, Arundo
Arundo donax
CDFA – B; Cal-IPC - High

This bamboo-like perennial grass can grow very tall (up to 8 m) and form very dense stands. It has well developed rhizomes which allows for vegetative propagation from intact and fragmented rhizomes, as well as fragmented stems. Arundo was brought into California by the early Spanish settlers from the Mediterranean area. It is found in riparian areas throughout California, especially along coastal waterways in Southern and Central California and waterways flowing into and through the Sacramento and San Joaquin Valleys. Very dense stands of arundo crowd out native vegetation, decreasing wildlife habitat and affecting water quality by reducing stream shading, changing sediment movement, and reducing stream bank stability. Arundo can carry fire up riparian channels into the forested lands adjacent to the streams, and in this sense acts like other invasive annual grasses (e.g., cheatgrass) in changing the natural fire regime and fire behavior in riparian forests.

Highlights:

- Mariposa Co. – Mechanical removal of arundo in Burns Creek in the town of Hornitos was done in June using California Department of Corrections (CDC) crews.
- San Mateo Co. – Restoration to improve habitat for the endangered fountain thistle involved the manual removal of arundo.
- Western Shasta Co. RCD - The Redding Stream Team treated 12 acres of arundo along Stillwater Creek.
- Santa Barbara Co. – Work continues in Lookout Park, Carpinteria Creek watershed, Santa Ynez River watershed, and Rincon Creek watershed.
- There is on-going control work in San Diego Co. (Artesian Creek, Lusardi County Open Space), Topanga Canyon, and Eastern Kern Co. and on the Cleveland and San Bernardino National Forests.

Fig 77: UCC Crews cutting *Arundo donax* to be followed by a cut-stump treatment with glyphosate; Cajon Wash, November 2011.

Photo: D. Nelson, San Bernardino NF

Himalaya Blackberry
Rubus discolor
CDFA – not rated; Cal-IPC – High

Himalaya blackberry, introduced from Eurasia, is the most common non-native bramble invading natural areas of California. It has biennial stems, perennial roots, and edible, black berries. This invasive species can be distinguished from native blackberries in that the stems are angled in cross-section, not round, and the leaves are evergreen, not deciduous. Himalaya blackberry is found throughout California except the desert areas and is often associated with moist open sites and riparian habitats.

Highlights:

- The ARRA-funded CCC strike teams treated Himalaya blackberry along the Owens River in Inyo Co. and along the Klamath River in Siskiyou Co.
- San Mateo Co. – Restoration to improve habitat for the endangered fountain thistle involved the manual removal of Himalaya blackberry.
- There are ongoing localized control efforts of Himalaya blackberry on the Eldorado, Lassen, and Sierra National Forests and the Lake Tahoe Basin Management Unit.

Rush skeletonweed, hogbite
Chondrilla juncea
CDFA – A; Cal-IPC - Moderate

This herbaceous perennial or biennial plant, native to Southern Europe, has stiff and wiry stems to about 1 m tall, with milky sap and deep taproots (2-3 m). The flowers are bright yellow and borne on stems developing from a rosette. It is not common in California although can grow in most areas of the state. In the wildlands rush skeletonweed is found most often in disturbed soils of roadsides and rangelands.

Highlights:

- Calaveras Co. – 61 acres were treated with aminopyralid or clopyralid at two sites.
- Sonoma Co. - Numerous (over 1,500) seedlings of skeletonweed were encountered in June at the Pepperwood Preserve; these were removed by hand. Several rosettes were treated with Milestone herbicide. A new population of skeletonweed was encountered in late June. This population is concentrated in a drainage far removed from the original population on the Preserve's property. The new population was estimated at approximately 1,000 plants and was comprised primarily of seedling plants. 139 outlying mature plants were removed by hand and the population was mapped. This population was treated with Milestone herbicide in July.
- San Mateo Co. – The San Mateo Weed Management Area, the Bay Area Early Detection Network, and partners are working to remove skeletonweed throughout the county. Occurrences along Amtrak right-of-ways were treated from San Francisco to Santa Clara Co.
- Alameda Co. – Skeleton weed was first detected here in 2009 along a highway right-of way. Alameda Co. Department of Agriculture and Caltrans are treating and resurveying the site annually.
- There is on-going eradication work on small populations of rush skeletonweed in Del Norte, Lassen, and Tuolumne Counties and on the Plumas and Tahoe National Forests.

Dyer's woad, Marlahan mustard
Isatis tinctoria
CDFA – B; Cal-IPC – Moderate

Introduced from Europe, this biennial has bright yellow flowers and distinctive dark hanging fruits with a single seed in each. The name dyer's woad is derived from historical cultivation in Europe as a source of blue dye. In California, it is primarily found in Northern California, as far south as the Bay Area and the Central Sierra Nevada Mountains inhabiting forests, rangelands and rights-of-ways. In the northern part of the State, it is considered beyond eradication. Forest managers in the northern part of the state have adopted a strategy that sets containment lines at certain points in the watersheds, beyond which treatment is initiated to eliminate outlier populations.

Highlights:

- Lassen NF - There is one large 9 acre site located at the Ladder Butte cinder pit on the Hat Creek Ranger District that is treated on an annual basis. Otherwise, single individual plants are scattered along the highways and are found when newly growing

in the spring and are treated when found.

- Klamath NF – populations are rapidly expanding. One site threatens a population of the Siskiyou Mariposa lily. Over 450 acres were treated on the Klamath NF in 2011.
- There is on-going eradication work of dyer's woad in Siskiyou, Lassen, and Shasta Counties and on the Modoc, Six Rivers, Plumas, Shasta-Trinity, and Stanislaus National Forests.

Fig 78: Large infestation of Dyer's woad (*Isatis tinctoria*) on the Klamath NF that is threatening nearby Siskiyou Mariposa Lilly

Photo: A. Hall, B. Jespersen, Klamath NF Weed Crew

Cape Ivy
Delairea odorata
CDFA – C; Cal-IPC - High

Cape ivy, a perennial vine, was introduced into the United States in the 1800's as an ornamental house plant. It has palmate-shaped leaves. It is especially problematic in coastal riparian areas, and can smother vegetation. It reproduces vegetatively from rhizomes, stolons, and fragments of rhizomes, stolons, and stems. It is very difficult to control.

Highlights:

- Marin Co. – The Audubon Canyon Ranch has treated populations at the Martin Griffin Preserve between Bolinas and Stinson Beach. Major challenges of rugged terrain and finding small patches underneath copious understory vegetation. Cape ivy is also being treated in the Golden Gate National Recreation Area and Point Reyes National Seashore.
- Monterey Co. RCD - 5 net acres of cape ivy treated in Andrew Molera State Park in partnership with state park employees.

Fig 79: Example of density of cape ivy in coastal Marin Co.

Photo: M. Danielczyk

Invasive Plants

Monitoring

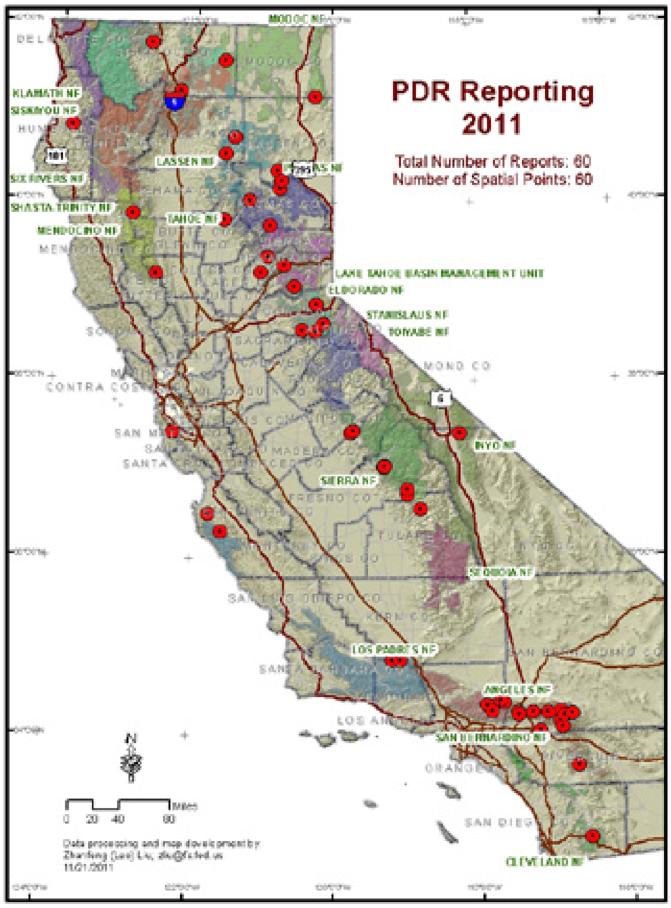
California Insect and Disease Atlas

By: Zhanfeng Liu and Lisa Fischer

Database Program

The California Insect and Disease Atlas (CAIDA) underwent a significant redesign in 2011. The database application was moved from the previous stand-alone platform based on Visual Basic to a new structure built within the readily available MS Office 2007 Access program, strengthening its user-friendly functions and eliminating any extra software requirement. Data collection has also been expanded to fully accommodate the existing Forest Service Forest Pest Detection Report (R5-3400-1).

The USFS Forest Health Technology Enterprise Team (FHTET) is expanding their national forest health information site which hosts the Pest Event Reporter (PER) (www.foresthealth.info). As a first step to integrate CAIDA with the PER, additional PER specific data fields were included. Agreement has been established with FHTET to collaboratively develop the next stage of CAIDA to become an integral part of the PER with web portal service hosted and supported by FHTET.



Map 6: Pest Detection reports in California, 2011.

Map by: Z. Liu

Pest Detection Reporting

For the year 2011, a total of 60 PDRs have been submitted and compiled into the CAIDA database, including 9 from the aerial survey program. GPS coordinates were recorded for the first time for all the reported sites. Damage agents reported included western pine beetle, annosus root disease, and fir engraver. Host trees reported included ponderosa pine, white fir, and Jeffrey pine. The 60 reported sites covered 25 counties and 14 national forests (based on the GPS coordinates provided). San Bernardino Co. with 11 reported sites ranked at the top and San Bernardino NF was the most reported national forest showing 12 PDR sites.

Insect and Disease Risk Modeling and Mapping

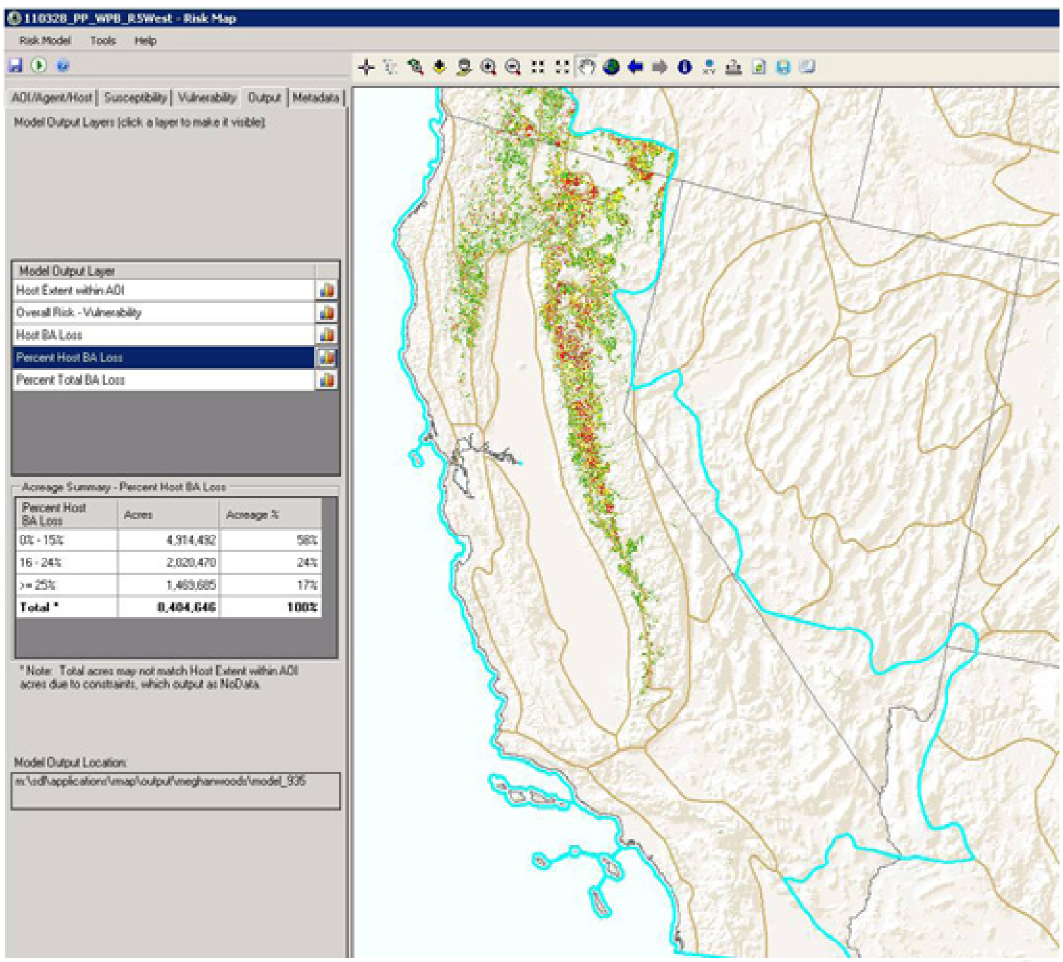
By: Meghan Woods and Lisa Fischer

Insect and Disease Risk Modeling in California was initiated in 1995. A national multi-criterion framework was established to facilitate a standardized modeling approach across all forest health regions to create a seamless set of risk models for forest insects and diseases. Model criteria and parameters vary across the landscape for each host type. Scientific literature, professional knowledge, and statistical data form the basis for the development of the host-specific models. Input criteria for the models include: stand density index (SDI), basal area (BA), quadratic mean diameter (QMD), precipitation, relative humidity, elevation, percent canopy cover, and temperature regime, among others. The most recent results were published in 2006. A new iteration of the national model is underway and scheduled to be completed in 2012.

During 2011, Region 5 finalized the California host surfaces modeled by the Forest Health Technology Team (FHTET). Region 5 also developed and finalized the host/pest risk models and submitted them via the Risk Map Application. Finalization of both the host surfaces and risk models was completed through a cooperative effort with Forest Service Regions 3, 4, and 6 to ensure seamless coverage and prevent model overlap.

Region 5 will be fully represented in the 2012 Risk Map with the addition of Hawaii to the National Map.

2006 risk maps are available on the USDA Forest Service, Forest Health Monitoring website at: http://www.fs.fed.us/r5/spf/fhp/fhm/risk/.



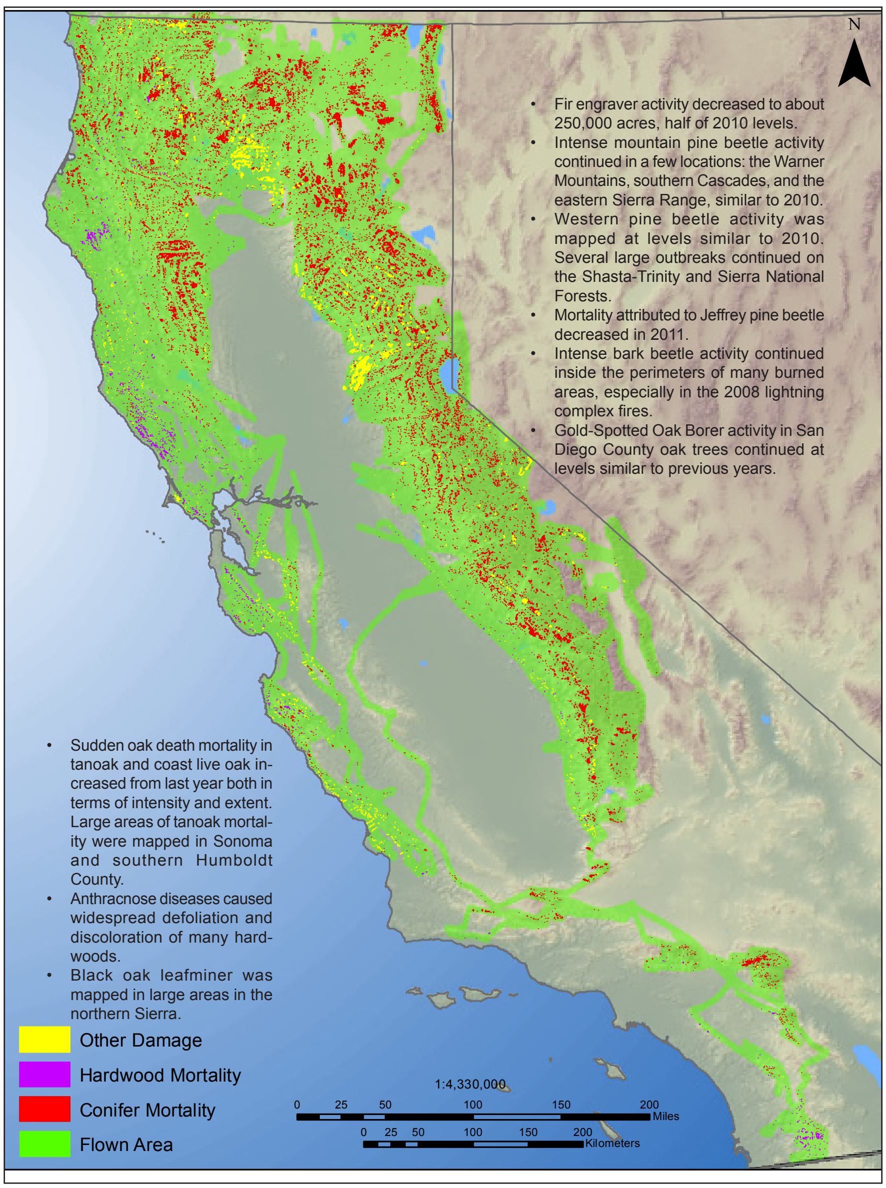
Map 7: RMAP screen showing possible percent basal area loss for ponderosa pine from western pine beetle over the next 15 years.

Map by: M. Woods

Aerial Detection Survey

By: Zack Heath, Brent Oblinger, Bob Noyes, and Jeff Moore

In 2011, forty-two million acres were surveyed throughout California covering all National Forests and forested National Parks and other federal, state and private lands. Over 23,000 miles were flown using fixed-wing aircraft. Regular annual surveys, special surveys for sudden oak death (SOD) along the North and Central Coasts, as well as a special survey for the gold-spotted oak borer (GSOB) along the South Sierra Foothills were conducted. A total of 537,000 acres were mapped with tree mortality due to insects, diseases, or abiotic stress. Overall, a decrease in total acres with mortality was found compared to last year. This was largely due to lower mortality levels associated with fir engraver. Pine beetle activity continued despite higher than normal precipitation this year and average precipitation levels in 2010. There was a 5-fold increase in oak and tanoak mortality (affecting nearly 8,000 acres) due to SOD compared to last year, which was associated with the current and previous year's precipitation levels. Oak mortality due to GSOB in San Diego Co. was detected at levels similar to previous years (affecting around 1,000 acres). Defoliation due to insects and foliar diseases was widespread this year, especially anthracnose diseases on sycamore and black oak.



Map 8: Mortality detected in 2011 via Aerial Survey.

Map: Z. Heath

Firewood Movement: CFPC Firewood Task Force

By: Matthew Bokach and Lisa Fischer

Interstate movement of firewood has been implicated in the rapid multi-state spread of destructive forest pests, such as the Emerald Ash Borer, *Agrilus plannipennis*, in the northern Midwest, and the Goldspotted Oak Borer, *Agrilus aurogutattus*, which is currently killing large numbers of native oak trees in eastern San Diego Co. A national multi-agency Firewood Task Force was created in late 2009 to address the complex issues involved with firewood movement. In 2011, the California Firewood Task Force was created under the auspices of the California Forest Pest Council and has launched an outreach campaign to deliver key messages to multiple audiences about the threat firewood movement poses to our forest resources. Outreach and education materials included question and answer sheets, and posters with the key message “Buy It Where You Burn It”, to encourage local use of firewood. Items such as decks of cards and Frisbees were also developed to hand out to the public with the firewood key message. Visit the Task Force website at www.firewood.ca.gov.

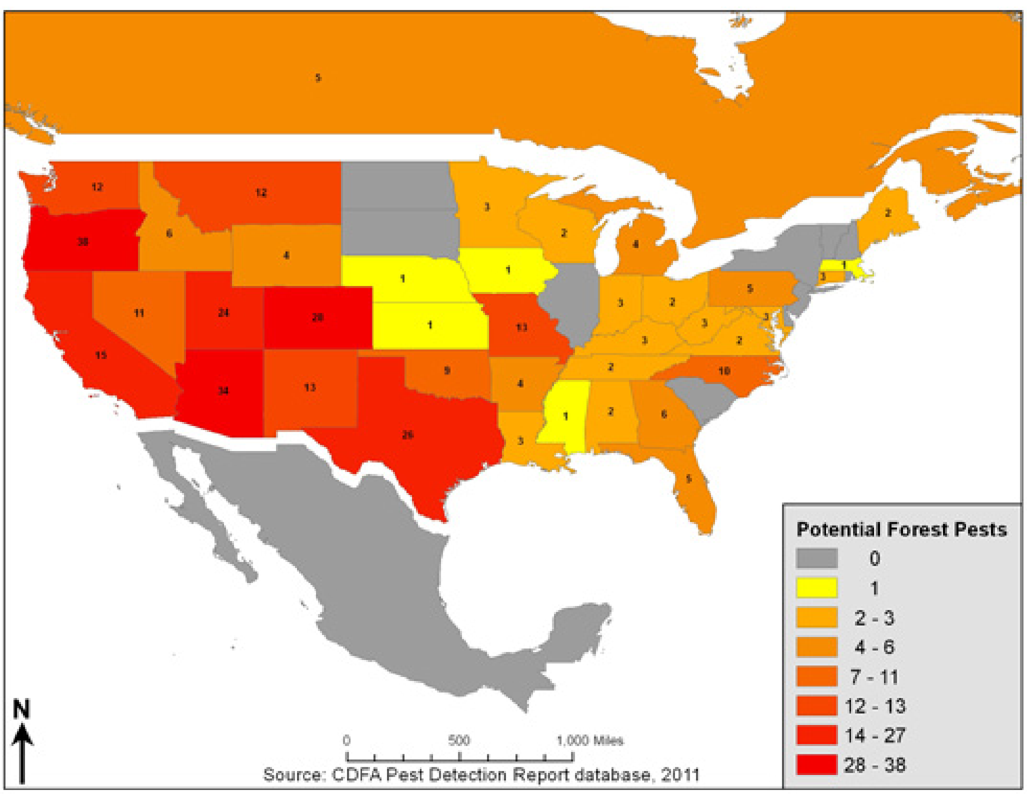
Posters, presentations and an article in *The Forestry Source* were also developed in 2011 to highlight the work of the multi-agency Task Force.

Data from CDFA’s pest detection database as well as reports from the sixteen border stations (see Map 10) across the state were analyzed and summarized to:

1. Determine how much firewood is entering the state;
2. Determine from where the firewood is coming and where it’s going;
3. Determine potential forest pests intercepted on firewood entering the state and their origins and destinations; and,
4. Investigate the potential threat to CA forests and parks from pests transported on or in firewood.

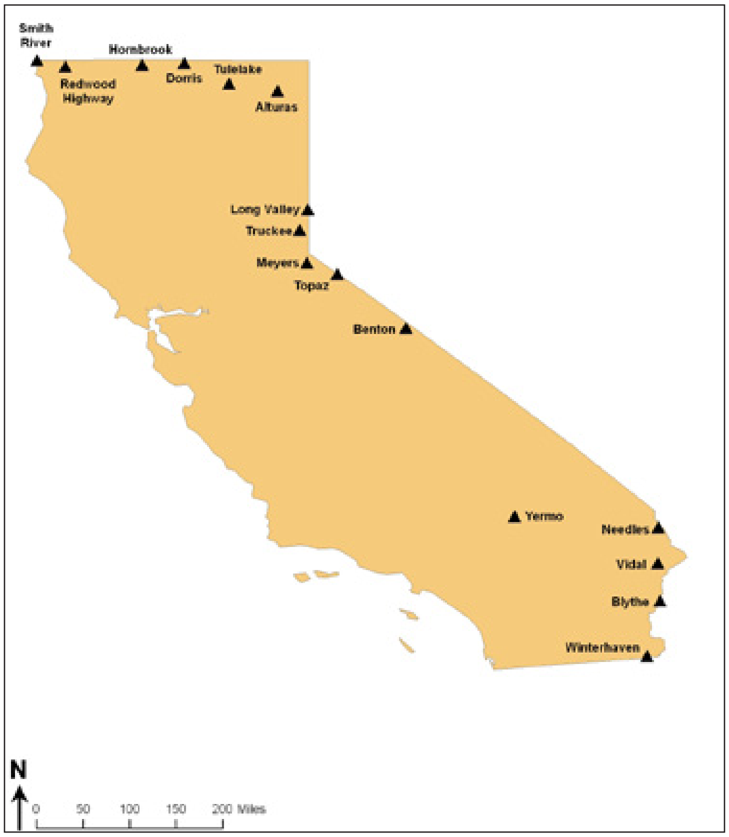
Map 9: Number of potential forest pests intercepted in firewood by CDFA border stations in 2011, by origin state.

Map: M. Bokach



Key findings:

- Almost 23 million pounds of firewood were recorded in 2011
- Top origns for firewood were Oregon, Texas and Arizona
- Pests were intercepted in firewood that originated in 47 other states, California, Canada (see Map 9 of origin states/countries)
- Over a quarter of the pests intercepted in firewood were in vehicles bearing California license plates
- 337 potential forest pests were intercepted in 2011
- Over 90% of the intercepted pests were beetles in the families Cerambycidae (longhorned beetles), Scolytinae (bark beetles), and Buprestidae (wood borers)
- Over a third of the potential forest pests (37%) were intercepted at the Needles Station



Map 10: Locations of CDFA agricultural border inspection stations.

Map: M. Bokach

Nearly all (96%) of the intercepted forest pests were going to a destination in California. Top destinations included: the greater Los Angeles urban area (27 pests), the Sacramento urban area (25 pests), Yosemite NP (20) pests, the San Francisco-Oakland urban area (19 pests), the Riverside-San Bernardino urban ara (14 pests), Placerville (11 pests), and the San Diego urban area and Bakersfield (10 pests each).

List of Common and Scientific Names

Insects

Common Name	Scientific Name
Invasive Insects	
Asian longhorned beetle	*Anoplophora glabripennis*
European gypsy moth	*Lymantria dispar*
Goldspotted oak borer	*Agrilus auroguttatus*
Granulated ambrosia beetle	*Xylosandrus crassiusculus*
Red gum lerp psyllid	*Glycaspis brimblecombei*
Redhaired pine bark beetle	*Hylurgus ligniperda*
No Common Name	*Araptus schwarzi* (Blackman)
No Common Name	*Pagiocerus frontalis* (Fabricius)
Bark Beetles and Wood Borers	
Bronze birch borer	*Agrilus anxius*
California fivespined Ips	*Ips paraconfusus*
California flatheaded borer	*Melanophila californica*
Cedar bark beetle	*Phloeosinus* sp.
Douglas-fir beetle	*Dendroctonus pseudotsugae*
Emarginate Ips	*Ips emarginatus*
Fir engraver	*Scolytus ventralis*
Flatheaded fir borer	*Melanophila drummondi*
Jeffrey pine beetle	*Dendroctonus jeffreyi*
Mountain pine beetle	*Dendroctonus ponderosae*
Pine engravers	*Ips* spp.
Pinyon Ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
Western pine beetle	*Dendroctonus brevicomis*
Defoliators	
Black oak leaf miner	*Eriocraniella aurosparsella*
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Elm leaf beetle	*Xanthogaleruca (=Pyrrhalta) luteola*
Fall webworm	*Hyphantria cunea*
Fruittree leaf roller	*Archyps argyrosphila*
Lodgepole pine needleminer	*Coleotechnites milleri*
Pine catkin sawflies	*Xyela* sp.
Pinyon sawfly	*Neodiprion edulicolus*
White fir sawfly	*Neodiprion abietis*
Other Insects	
Alder flea beetle	*Macrohaltica ambiens (= Altica ambiens)*
Black Pineleaf Scale	*Nuculaspis californica*
Douglas-fir needle midge	*Contarinia* sp.
Douglas-fir twig beetle	*Pityophthorus pseudotsugae*
Gouty pitch midge	*Cecidomyia piniinopis*
Hemlock wooly adelgid	*Adelges tsugae*
Incense cedar scale	*Xylococculus macrocarpae*
Lacebugs	*Corythuca* spp.
Needle fascicle scale	likely *Matsucoccus fasciculensis*
Oak leaf galls	*Antron douglasii*
Pine reproduction weevil	*Cylindrocopturus eatoni*
Pine twig beetle	*Pityophthorus confertus* & *P. confinis*

Ponderosa pine tip moth	*Rhyacionia zozana*
Ponderosa pine twig scale	*Matsucoccus bisetosus*
Scales	*Physokermes insignicola* & *Physokermes* sp.
Sequoia pitch moth	*Synanthedon sequoiae*
Weevil	*Scythropus* sp.

Diseases and their Causal Pathogens

Common Name	Scientific Name
Cankers	
Bot cankers of oaks	*Botryosphaeria* sp.
Botryosphaeria canker of coast redwood	*Botryosphaeria* sp.
Canker rot of blue oak	*Inonotus* sp.
Charcoal canker of oak	*Biscogniauxia mediterranea*
Cytospora canker of true fir	*Cytospora abietis*
Diplodia blight of pines	*Diplodia pinea*
Douglas-fir canker	*Diaporthe lokoyae* or *Dermea pseudotsugae*
Phomopsis canker of pines	*Phomopsis* sp.
Pitch canker	*Fusarium circinatum*
Redwood tip dieback	*Botrytis* sp.
Seiridium canker	*Seiridium* sp.
Stem canker of pines	*Phomopsis* sp.
Declines	
Bishop pine decline	Multiple agents
Incense cedar decline	Multiple agents
Sudden oak death	*Phytophthora ramorum*
Dwarf Mistletoes	
Douglas-fir dwarf mistletoe	*Arceuthobium douglasii*
Limber pine dwarf mistletoe	*Arceuthobium cyanocarpum*
Red fir dwarf mistletoe	*Arceuthobium abietinum* f. sp. *magnificae*
Sugar pine dwarf mistletoe	*Arceuthobium californicum*
Western dwarf mistletoe	*Arceuthobium campylopodum*
Western hemlock dwarf mistletoe	*Arceuthobium tsugense* subsp. *Tsugense*
White fir dwarf mistletoe	*Arceuthobium abietinum* f. sp. *concoloris*
Foliage Diseases	
Dogwood anthracnose	*Discula destructive*
Elytroderma Needle Cast	*Elytroderma deformans*
Foliar blight of madrone	*Mycosphaerella* sp. & *Monochaetia* sp.
Sugar pine needle cast	*Lophodermella arcuata*
Sycamore anthracnose	Apiognomonia veneta (Discula platani)
True fir needle cast	*Lirula abietis-concoloris*
Nursery Diseases	
Sudden oak death	*Phytophthora ramorum*
Leaf Scorch	
Maple Leaf Scorch	*Xylella fastidiosa*

Root Diseases	
Armillaria root disease	*Armillaria mellea, Armillaria* sp.
Black stain root disease	*Leptographium wageneri*
Heterobasidion root disease	*Heterobasidion irregulare*
	Heterobasidion occidentale
Laminated root rot	*Phellinus weirii*
Port-Orford-cedar root disease	*Phytophthora lateralis*
Phytophthora root rot	*Phytophthora cinnamomi*
Schweinitzii root disease	*Phaeolus schweinitzii*
Rusts	
Eucalyptus/guava/myrtle rust	*Puccinia psidii*
Western gall rust	*Endocronartium harknessii* =
	Peridermium harknessii
White pine blister rust	*Cronartium ribicola*
True Mistletoes	
Oak Leafy Mistletoe	*Phoradendron villosum*
Incense cedar leafy mistletoe	*Phoradendron libocedri*
Fir leafy mistletoe	*Phoradendron pauciflorum*
Miscellaneous Parasites	
Dodder	*Cuscuta subinclusa*

Trees

Common Name	Scientific Name
Conifers	
Pines	*Pinus* spp.
Aleppo pine	*Pinus halepensis*
Bishop pine	*Pinus muricata*
Bristlecone pine	*Pinus longaeva*
Coulter pine	*Pinus coulteri*
Foxtail pine	*Pinus balfouriana*
Gray pine	*Pinus sabiniana*
Italian stone pine	*Pinus pinea*
Jeffrey pine	*Pinus jeffreyi*
Knobcone pine	*Pinus attenuata*
Limber pine	*Pinus flexilis*
Lodgepole pine	*Pinus contorta* var. *murrayana*
Monterey pine	*Pinus radiata*
Ponderosa pine	*Pinus ponderosa*
Singleleaf pinyon	*Pinus monophylla*
Sugar pine	*Pinus lambertiana*
Torrey pine	*Pinus torreyana*
Western white pine	*Pinus monticola*
Whitebark pine	*Pinus albicaulis*
True firs	*Abies* spp.
Grand fir	*Abies grandis*
Red fir	*Abies magnifica*
White fir	*Abies concolor*
Others	
Brewer spruce	*Picea breweriana*
Douglas-fir	*Pseudotsuga menziesii*
Engelmann spruce	*Picea engelmannii*

Giant sequoia	*Sequoia giganteum*
Incense-cedar	*Calocedrus decurrens*
Leyland cypress	*Cupressocyparis leylandii*
Mountain hemlock	*Tsuga mertensiana*
Western hemlock	*Tsuga heterophylla*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Coast redwood	*Sequoia sempervirens*
Sitka spruce	*Picea sitchensis*
Hardwoods	
Oaks	*Quercus* spp.
Blue oak	*Quercus douglasii*
California black oak	*Quercus kelloggii*
Canyon live oak	*Quercus chrysolepis*
Coast live oak	*Quercus agrifolia*
Shreve Oak	*Quercus parvula* var. *shrevei*
Other	
Aspen	*Populus tremuloides*
Big-leaf maple	*Acer macrophyllum*
California bay laurel	*Umbellularia californica*
California sycamore	*Platanus racemosa*
Camphor	*Cinnamomum camphora*
Cottonwoods	*Populus* sect. *Aigeiros* spp.
Golden (giant) chinquapin (chinkapin)	*Castanopsis chrysophylla*
Elms	*Ulmus* spp.
Eucalyptus	*Eucalyptus* spp.
Laurel sumac	*Malosma laurina*
Mountain mahogany	*Cercocarpus* sp.
Pacific madrone	*Arbutus menziesii*
Paper bark tea tree	*Melaleuca quinquenervia*
Poison oak	*Toxicodendron diversilobum*
Poplar	*Populus* spp.
Tanoak	*Lithocarpus densiflorus*
Willow	*Salix* spp.

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Appendix A

Brief Description of CDFA weed ratings:
A – Rated - Known to be economically or environmentally damaging and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state. If found in the state, A-rated weeds are subject to state or county enforced action involving eradication or containment.

B – Rated - Known to be economically or environmentally damaging and of limited distribution. B-rated pests are eligible to enter the state if the receiving county has agreed to accept them. If found in the state, they are subject to state endorsed holding action and eradication only to provide for containment, as when found in a nursery. At the discretion of the individual county agricultural commissioner they are subject to management.

C – Rated - Known to be economically or environmentally damaging and, if present in California, it is usually widespread. C-rated organisms are eligible to enter the state as long as the commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness

A brief description of the Cal-IPC ratings in this report (for complete descriptions go to http://www.cal-ipc.org/ip/inventory/index.php#categories):
High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. These species may be locally persistent and problematic.

In addition to these ratings, if a species evaluation indicated a significant potential for invading new ecosystems, an Alert designation is used so that land managers may watch for range expansions.

I. FIELD INFORMATION (See instructions on reverse)		
1. County:	**2. Forest (FS only):**	**3. District (FS only):**
4. Legal Description: **T. R.** **Section (s)** **5. Date:**	**6. Location:** **UTM:**	**7. Landownership:** National Forest ☐ Other Federal ☐ State ☐ Private ☐
8. Suspected Cause of Injury: 1. Insect ☐ 5. Chemical ☐ 2. Disease ☐ 6. Mechanical ☐ 3. Animal ☐ 7. Weed ☐ 4. Weather ☐ 8. Unknown ☐	**9. Size of Trees Affected:** 1. Seedling ☐ 4. Sawtimber ☐ 2. Sapling ☐ 5. Overmature ☐ 3. Pole ☐	**10. Part(s) of Tree Affected:** 1. Root ☐ 5. Twig ☐ 2. Branch ☐ 6. Foliage ☐ 3. Leader ☐ 7. Bud ☐ 4. Bole ☐ 8. Cone ☐
11. Species Affected:	**12. Number Affected:**	**13. Acres Affected:**
14. Injury Distribution: 1. Scattered ○ 2. Grouped ○	**15. Status of Injury:** 1. Decreasing ○ 2. Static ○ 3. Increasing ○	**16. Elevation:**
17. Plantation? 1. Yes ○ 2. No ○	**18. Stand Composition (species):**	**19. Stand Age and Site Class:** Age: Class:

20. Stand Density:	**21. Site Quality:**

22. Pest Names (if known) and Remarks (symptoms and contributing factors):

23. Sample Forwarded:	**24. Action Requested:**	**25. Reporter's Name:**	**26. Reporter's Agency:**
1. Yes ○ 2. No ○	1. Information only ☐ 2. Lab Identification ☐ 3. Field Evaluation ☐		

27. Reporter's Address, email and Phone Number:

email: ______________________ phone: ______________

Address 1: ______________________

Address 2: ______________________

City: ______________ State: ______________ Zip: ________

II. Reply (Pest Management Use)

28. Response:

29. Report Number:	**30. Date:**	**31. Examiner's Signature:**

R5-3400-1 (Rev. 3/02)

Completing the Detection Report Form

Heading (Blocks 1-7): Enter all information requested. In Block 6, **LOCATION**, provide sufficient information for the injury center to be relocated. If possible, attach a location map to this form.

Injury Description (Blocks 8-15): Check as many boxes as are applicable, and fill in the requested information as completely as possible.

Stand Description (Blocks 16-21): This information will aid the examiner in determining how the stand conditions contributed to the pest situation. In Block 18 indicate the major tree species in the overstory and understory. In Block 19, indicate the stand age in years and/ or the size class (seedling-sapling; pole; young sawtimber; mature sawtimber; overmature or decadent).

Pest Names (Block 22): Write a detailed description of the pest or pests, the injury symptoms, and any contributing factors.

Action Requested (Block 24): Mark “Field Evaluation” only if you consider the injury serious enough to warrant a professional site evaluation. Mark “Information Only” if you a reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

Reply (Section II): Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

Handling Samples: Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a sturdy container, and enclose a completed copy of the detection report.

Your participation in the Cooperative Forest Pest Detection Survey is greatly appreciated. Additional copies of this form are available from the Forest Service - Forest Health Protection, and from the California Department of Forestry and Fire Protection.

The Cooperative Forest Pest Detection Survey is sponsored by the California Forest Pest Council. The Council encourages federal, state, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner:

Federal Personnel: Send all detection reports through appropriate channels. Mail injury samples with a copy of this report to one of the following offices:

USDA Forest Service State and Private Forestry Forest Health Protection 1323 Club Drive Vallejo, CA 94592	Forest Health Protection Shasta-Trinity National Forest 3644 Avtech Parkway Redding, CA 96002	Forest Health Protection Stanislaus National Forest 19777 Greenley Road Sonora, CA 95370

Forest Health Protection Lassen National Forest 2550 Riverside Drive Susanville, CA 96130	Forest Health Protection San Bernardino National Forest 602 Tippecanoe Avenue San Bernardino, CA 92408-2677

State Personnel: Send all detection reports through channels. Mail injury samples with a copy of this report to one of the following appropriate offices:

Forest Pest Management CA Dept of Forestry & Fire Protection PO Box 944246 Sacramento, CA 94244-2460	Forest Pest Management CA Dept of Forestry & Fire Protection 6105 Airport Road Redding, CA 96002
Forest Pest Management CA Dept of Forestry & Fire Protection 2690 N. State Street Ukiah, CA 95482	Forest Pest Management CA Dept of Forestry & Fire Protection 4050 Branch Road Paso Robles, CA 93446

Private Land Managers and Individuals: Send all detection reports and samples to the closest California Department of Forestry and Fire Protection office listed above.

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